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SOME FURTHER OBSERVATIONS ON CHERRY BARKS.

BARK OF THE WESTERN FORM OF PRUNUS VIRGINIANA, LINNÉ.

By Edson S. Bastin.

In Brewer and Watson's Flora of California this is treated as a distinct species, under the name of *Prunus demissa*, Walters; but Prof. C. S. Sargent regards it as only a form, not even a distinct variety, of the Choke cherry, *Prunus Virginiana*. It is somewhat less diffuse, and more tree-like in habit, though seldom attaining a height of more than 12 feet. Its leaves are pubescent underneath instead of smooth, their bases frequently somewhat cordate instead of wedge-shaped, their texture rather more leathery, and the fruits are usually less astringent than those of the Eastern form. Differences such as these, however, are certainly not specific, especially as the Eastern form is known to vary considerably in the shape, texture and hairiness of its leaves and in the color and astringency of its fruit. If Prof. Sargent's view be correct, the Choke cherry is, as he says, the most widely distributed of any American species of tree, for, to quote his language: "It grows within the Arctic Circle, ranging across the continent from Labrador and the shores of Hudson's Bay to the valley of the Mackenzie River, in latitude 62°, and crossing the Rocky Mountains, reaches the Pacific Coast in Northern British Columbia; it extends southward through Eastern North America to southern Georgia, Louisiana, Texas, northern Mexico and along the mountain ranges of Western North America.

"In the Eastern States it is one of the most common of the large tree-like shrubs, growing usually along the margins of the forest, generally in rich, rather humid soil, and along highways and fence-

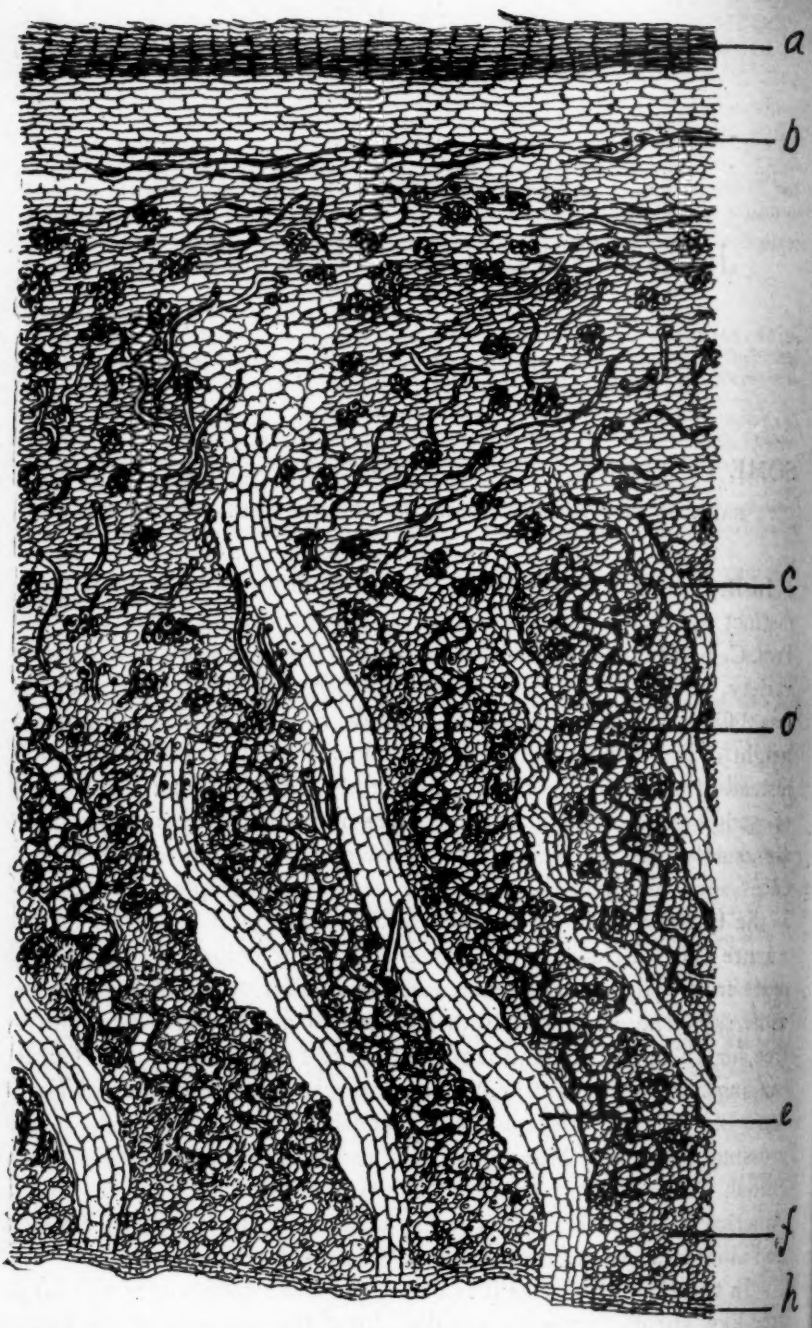

FIG. 1.—Cross-section of bark of Prunus demissa, magnified 100 diameters.

rows; in southern Oregon and northern California it inhabits low valleys, where, in rich, moist soil, in the neighborhood of streams, it attains a large and arborescent habit; on the mountain ranges of the interior of the continent, where it is confined to elevated valleys, in southern California, and at the northern and southern limits of its range, it is a low shrub." (The Silva of North America.)

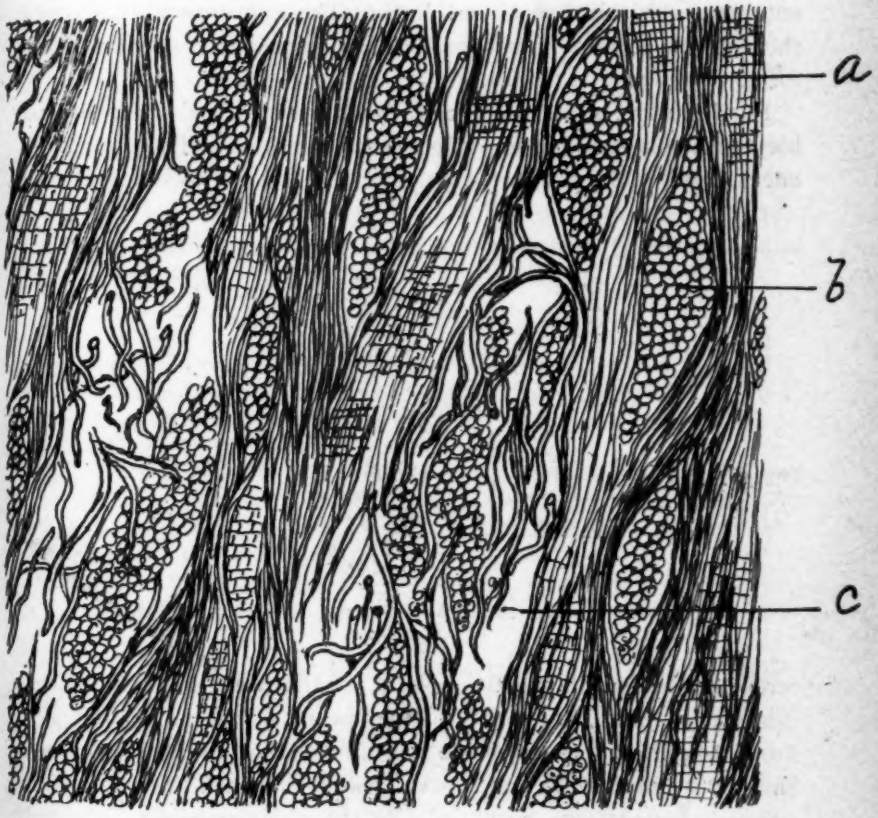

FIG. 2.—Longitudinal-tangential section of inner bark of Prunus demissa, magnified 100 diameters.

The specimens of bark examined by me were kindly supplied by Miss Alice Eastwood, of the California Academy of Sciences, and were obtained from Marin County, in that State.

To the taste these specimens were less bitter, but quite as aromatic as good specimens of the bark of Prunus Serotina, excelling

in the latter respect any specimens of *P. Virginiana* that the writer has before tested. This difference can easily be accounted for by differences in climatic conditions. No differences were observable between the bark of the Eastern and Western forms in the external markings, excepting the purely accidental one that the bark of older stems in the Western form was mostly covered with growths of crustaceous lichens, decking the surface with grayish and whitish patches and blackish dots and lines. The fracture and the color of the interior surface correspond closely with those of our Eastern form.

Furthermore, a microscopic study does not reveal any considerable differences between the Western form and ours. The slight differences revealed by the drawings may well be due to the widely dif-

FIG. 3.—Starch from the bark of Prunus demissa, magnified 1,200 diameters.

ferent conditions of growth. There are the wavy and oblique medullary rays that characterize all the species of the group; but, as in our Choke cherry, the rays are less oblique than in the other species thus far studied. The bast areas between the rays show wavy, compressed sieve-tissues, with walls in the older portions, irregularly thickened, and numerous long, slender, lignified bast fibres arranged irregularly, singly or in clusters. These fibres are frequently not straight, but wavy, particularly in the neighborhood of the medullary rays.

Beyond the extremities of the medullary rays, in the cortex or middle bark, occur also numerous sclerenchyma fibres, a fact which was noted in my previous description of our Eastern form. These

fibres are either clustered or single, and irregularly distributed. They are commonly wavy, and their position may be transverse or oblique, as well as lengthwise of the bark.

Stellate masses, as well as single crystals of calcium oxalate abound in all parenchymatous portions of the bark.

Starch in small quantities was also found in the parenchyma. As in other cherry barks, it is very small grained, but it differs from those in the others thus far studied, in the fact that the grains are mostly compound, the masses often consisting of a dozen or more granules. The hilum of the individual granule is usually quite distinct and is centrally located.

The fact that the Western and Eastern forms are not to be regarded as distinct species, or even as distinct varieties, does not preclude the possibility that the former may be richer in medicinal constituents. Indeed, its more aromatic taste and odor suggest that it is so, and that it might repay chemical investigation.

DESCRIPTION OF FIGURES.

Fig. 1, transverse section of the bark of the Pacific Coast form of *Prunus Virginiana*, magnified 100 diameters; *a*, periderm; *b*, sclerenchyma fibres in cortex; *c*, a secondary medullary ray; *d*, bast fibres; *e*, a primary medullary ray; *f*, later formed phloëm elements; *h*, cambium tissue.

Fig. 2, longitudinal section of the same, made in a tangential direction well toward the outer layer of the bast; *a*, bast fibres; *b*, medullary ray near its outer extremity; *c*, fissure, with loosely arranged and much contorted bast fibres. Magnification, 100 diameters.

Fig. 3, starch grains from the same, magnified 1,200 diameters.

AGAR-AGAR AS A BASE IN GLYCERIN SUPPOSITORIES.

By Frank G. Ryan.

Contribution from the Pharmaceutical Laboratory of the Philadelphia College of Pharmacy.

Some months ago, E. Lomuller published in *Il Giornale di Farmacia*, a formula directing the use of agar-agar in the preparation of glycerin suppositories.

It was claimed that this substance produced a more satisfactory product than did gelatin, and, on that account, no doubt, the proposed formula has been reprinted in a number of American and foreign journals. But, as no comparison was made between the

qualities of the suppositories made with agar-agar and with sodium stearate, which is so largely used in this country, the writer decided to investigate the matter.

Agar-agar is a substance obtained from several species of algæ. It is known, also, as Japanese isinglass. (See United States Dispensatory, seventeenth edition, pages 724 and 1638).

The formula published was as follows:

Agar-agar	10 grammes.
Distilled water	200 cubic centimeters.
Glycerin	200 grammes.

Dissolve the agar-agar in the water by the aid of heat, constantly stirring, add the glycerin, and strain while hot.

Following these directions, the writer prepared a sample of suppositories from the given quantities. The suppositories, therefore, contained 50 per cent. of glycerin. They were very elastic, and had not sufficient firmness to admit of being easily introduced into the rectum. Such an article would hardly be received with much favor by the physicians of this country. A sample of suppositories containing 75 per cent. of glycerin was then made. These were firmer than those containing 50 per cent., and could be used without much difficulty; however, they did not possess the firmness of those made with sodium stearate.

An attempt was made to produce suppositories stronger than 75 per cent., but it was without good results, as the glycerin had a tendency to separate from the mass upon cooling.

In making the suppository mass it was found better to change the manipulation somewhat. The agar-agar was first soaked with cold water, and the latter expressed. After calculating the amount of water retained, sufficient to supply the proper amount was added. The glycerin was then added, and the whole heated on a water-bath until the agar-agar was dissolved, after which the solution was strained.

The following formula may be used by these directions for a suppository mass containing 75 per cent. of glycerin.

Agar-agar	5 grammes.
Distilled water	45 cubic centimeters.
Glycerin	150 grammes.

On account of the smaller quantity of glycerin contained and the elasticity of the mass, I do not consider the product of this method

one that could be used to replace the glycerin suppository now in common use.

The suppositories made with agar-agar have, however, these advantages: they easily leave the moulds, and are not affected to the same extent by exposure as are those containing sodium stearate.

No experiment was made to ascertain the value of the suppositories made with agar-agar as a laxative.

CALX SULPHURATA.

By Irwin A. Becker,

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 150.

The United States Pharmacopœia of 1880 directed *calx sulphurata* to be prepared by heating together finely powdered lime and precipitated sulphur, but in the revision of 1890, the official process was made to consist in heating dried calcium sulphate with charcoal and starch. The Pharmacopœia of 1880 fixed the strength of the preparation as containing not less than 36 per cent. of calcium monosulphide; the revision of 1890 describes the product as containing at least 60 per cent. of that substance.

The method of estimating the calcium monosulphide is the same now as in the former revision, and depends upon the complete precipitation of the copper from a definite amount of copper sulphate by a weight of the product which, if it be of full strength, should contain sufficient of the calcium monosulphide to convert all of the copper into insoluble copper sulphide.

With the view of ascertaining whether or not the manufacturing chemists had adopted the increased strength of the lately enforced Pharmacopœia, samples were procured from New York, Philadelphia and St. Louis, and examined by the following official directions: "If 1 gramme of sulphurated lime be gradually added to a boiling solution of 2·08 grammes of cupric sulphate in 50 c.c. of water, the mixture digested on a water-bath for fifteen minutes, and filtered when cold, no color should be imparted to the filtrate by one drop of potassium ferro-cyanide T. S. (presence of at least 60 per cent. of pure calcium monosulphide)."

When the samples were treated in this manner it was found that in no case was 1 gramme of the sample sufficient to completely pre-

cipitate the copper, for in all cases the supernatant liquid possessed a green color. It having thus been proven that none of the samples were of full official strength, sufficient of the sample was added to supply the deficiency and fulfil the indication of complete precipitation, in order to ascertain the exact amount of calcium monosulphide present.

The quantity required for this purpose was determined by supplying it from a known weight and deducting from this the weight of the unused portion.

The table gives the amount in grammes of each sample needed for the official test, as also the corresponding percentage content of calcium monosulphide.

Sample.	Amount Required.	Percentage of Calcium Monosulphide.
U. S. P.	1·000	60·00
1	1·277	45·52
2	1·303	44·45
3	2·358	24·85
4	1·386	41·59
5	1·621	35·73

Sample No. 5 was received wrapped in three papers; the middle one was parchment paper. The other samples were in small cork-stoppered vials, sealed with paraffin and capped with foil.

Sample No. 3 was not claimed by the manufacturer (who was aware that this comparison was to be made) to be the official substance, but merely a crude calcium sulphide. If we exclude this sample on account of what has just been said, we still have the remaining four, showing percentages nearer to 36, the amount ordered by the Pharmacopœia of 1880, than to the 60 per cent. at present required.

TUBULAR PRISMATIC CRYSTALS.

By Lyman F. Kebler.

Monobromated camphor furnishes us with crystals of at least two particular habits, prisms and scales. Exactly what it is that determines the habit of a crystal is not known. Experiments appear to indicate that impurities exert a powerful influence on the forms of

crystals developed. The presence of sodium hydroxide in a solution of sodium chloride may cause the latter to crystallize in octahedra instead of the usual cubes, and the presence of the same agent in a concentrated solution of common alum conduces to the formation of cubes instead of the customary octahedra.

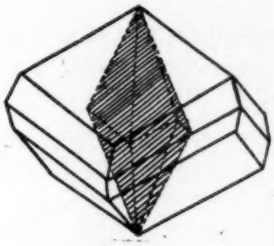

FIG. 1.

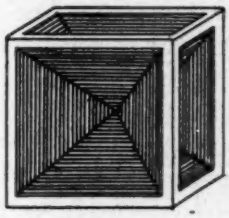

FIG. 2.

It frequently happens that a well-developed crystal can be seen within a larger crystal, both being of the same form and composition. Occasionally, we meet one form of crystal enveloping another

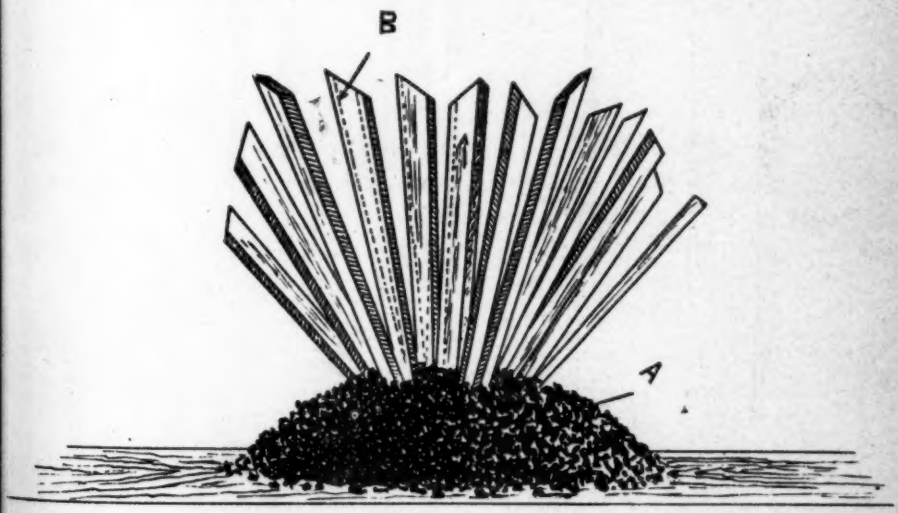

FIG. 3.

form. Prof. Williams, in his admirable work on crystallography, cites a crystal of calcite of rhombohedral habit, in the centre of which can plainly be seen a darker scalenohedron (*Fig. 1*).

The cavernous crystals (*Fig. 2*), or "hoppers," as they are sometimes called, present another singular form of crystallization. These

skeleton forms tend to develop when the crystals grow rapidly. Halite, galena and potassium iodide are commonly met with in this form. Mr. Foote, of this city, also showed me a shallow, cup-like crystal of vanadinite, which was, indeed, phenomenal. Irregularities of surfaces are often produced by corrosion subsequent to the formation of the crystals.

Hollow crystals of the following nature are occasionally met with: A crystal develops around a foreign substance of a less

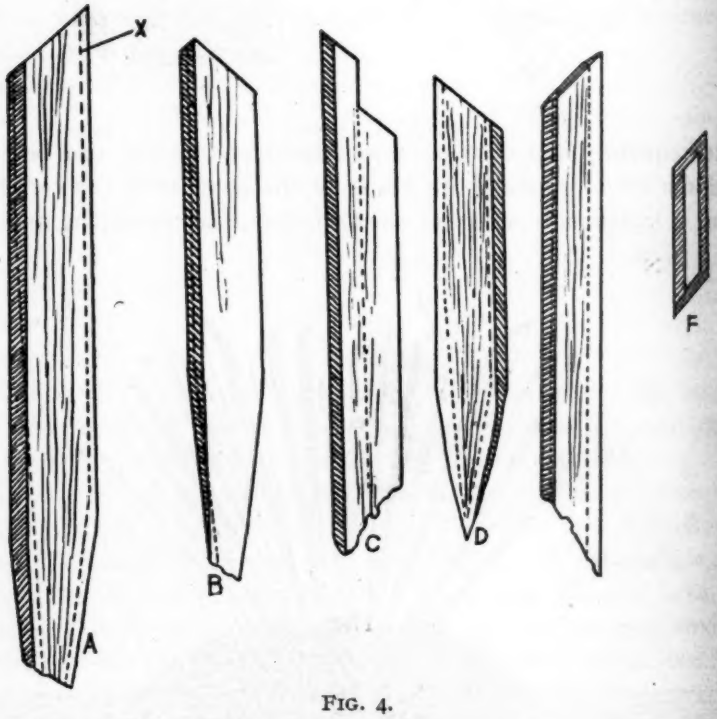

FIG. 4.

resisting nature. This foreign substance, in process of time, is removed by chemical or physical agents, leaving a hollow crystal. Quartz crystals of this nature have been found.

Thus, we have examples of one crystal developing around another, crystals whose faces are cavernous, irregularities caused by corrosion, and hollow crystals, formed as described above; but, to my knowledge, no geometrical, tubular crystals—crystals that have

developed around a void or their mother-liquor—have ever been seen, at least never reported.

In the course of some investigations, I obtained a growth of hollow crystals of monobromated camphor. I have often crystallized the above substance, but never before nor since have tubular crystals been formed. To me they were full of curiosity, having in all my crystallographic studies never seen or heard of hollow crystals. Prof. Pettee, in charge of mineralogy at the University of Michigan, to whom some crystals were sent, reported that the specimens sent him were without parallel for hollowness.

The tubular crystals were obtained as follows: A given quantity of crude monobromated camphor was dissolved in an equal weight of hot benzin, one-fourth a smuch animal charcoal added as there was monobromated camphor, boiled on the water-bath for about fifteen minutes, removed, vigorously rotated, so that the charcoal accumulated, cone-shaped, in the centre of the bottom of the flask, allowed to cool and crystallize over night. The crystals radiated in all directions from the cone-shaped charcoal (*Fig. 3*).

The tubular structure was observed by the mother-liquor retreating from the hollow of the crystals while drying them on filter-paper.

The prismatic crystals belong to the monoclinic system; vary in length from 2·5 to 4·2 centimeters; in width, from 3 to 4·6 millimeters, and in thickness, from 1·5 to 3·1 millimeters. The cross-sections of the crystals as well as the cross-sections of the orifices are rhombs. The free ends of the crystals are terminated by single planes, inclined about 45°. A few crystals are terminated by two planes, one large and one small plane, forming, nearly, a right angle with each other. The supporting ends of the crystals are somewhat constricted, on account of the crystal aggregate, tapering, in several instances, on the narrow sides, for several centimeters. This distortion of the crystal destroys the symmetry of hollow as well as that of the crystal.

Fig. 4 represents the various crystals in cross-section and side views.

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NOTES ON THE RECENT LITERATURE OF BOTANY AND MATERIA MEDICA.

By George M. Beringer.

In accepting the commission of the editor to prepare for the American Journal of Pharmacy reviews and abstracts from the current literature of botany and materia medica, the writer fully realizes the impossibility of at all presenting a large portion of the most valuable purely scientific labors of botanists, and must necessarily restrict the contributions to those most salient matters of more or less interest to pharmaceutical readers.

Botanical Nomenclature.

Botanical nomenclature continues to occupy a large share of the attention of systematic botanists, especially in America. Since the action of the Botanical Section of the A. A. A. S., at the Rochester meeting in 1892, the discussion has been persistently maintained. At the Madison meeting in 1893, the botanists deemed it advisable to take even a more advanced stand, adopting the rule of priority in toto. The resolutions of the previous year were amended, and the clause of Section III, which had decided that the earliest specific name *is not to be retained* if it is identical with the generic name or with a specific name previously used in that genera, was repealed.

The repeal of this clause is to be regretted, as it has rendered possible the adoption of such barbarian scientific names as Apios Apios, Hepatica Hepatica, Benzoin Benzoin, Barbarea Barbarea, Abutilon Abutilon, Linaria Linaria, and Catalpa Catalpa.

The "List of Pteridophyta and Spermatophyta Growing Without Cultivation in Northeastern America," prepared by the committee appointed by these conventions, represents the views of the most progressive of the nomenclaturists, and has focussed the discussion which, in some directions, has become quite personal and acrimonious. It is significant that these radical ideas of nomenclature are being largely adopted by American botanical writers, and that in such a classical work as "Sargent's Silva of North America," these rules are being strictly followed.

The following list shows a few of the changes proposed in the names of some of the best known-plants. To pharmacists it is interesting to note the changes these views effect in the names of

drug-yielding plants, and especially those that are official, and will indicate some of the changes likely to appear in the next edition of our Pharmacopœia:

Common Name.	Official Drug Name.	Names as Given in Gray's Manual or the Present Pharmacopœia.	Proposed Names.
Couch-Grass	Triticum	Agropyrum repens (L.), Beauv.	Agropyron[1] repens (L.) Beauv.
Sassafras	Sassafras	Sassafras variifolium (Salis.). O. Kuntze, (U. S. P.); Sassafras officinale, Nees.	Sassafras Sassafras (L.) Karst.
Yellow-Pine		Pinus mitis, Michx.	Pinus echinata Mill.
Scrub-Pine		Pinus inops, Ait.	Pinus Virginiana Mill.
Fly-Poison		Amianthium muscætoxicum, Gray	Chrosperma muscætoxicum (Walt.) Kuntze.
False Solomon's Seal		Smilacina racemosa, Desf.	Vagnera racemosa (L.) Morong.
Larger Yellow Lady's Slipper	Cypripedium	Cypripedium pubescens, Swartz	Cypripedium hirsutum Mill.
Sweet Fern		Myrica asplenifolia, Endl.	Comptonia peregrina (L.) Coulter.
Alder		Alnus serrulata, Willd.	Alnus rugosa (Ehrh.) Koch.
Beech		Fagus ferruginea, Ait.	Fagus atropunicea (Marsh.) Sudw.
Spanish-Oak		Quercus falcata, Michx.	Quercus digitata (Marsh.) Sudw.
Live Oak		Quercus virens, Ait.	Quercus Virginiana Mill.
Slippery Elm	Ulmus	Ulmus fulva, Michx.	Ulmus pubescens Walt.
Osage Orange		Maclura aurantiaca, Nutt.	Toxylon pomiferum Raf.
Buckwheat		Fagopyrum esculentum, Moench.	Fagopyrum Fagopyrum (L.) Karst.
Sweet-scented Water Lily		Nymphæa odorata, Ait.	Castalia odorata (Dryand), Woodv. & Wood.
Spatter-Dock		Nuphar advena, R. Br.	Nymphæa advena Soland.
Magnolia	Magnolia (1880)	Magnolia glauca, L.	Magnolia Virginiana L.
Liverwort		Hepatica triloba, Chaix.	Hepatica Hepatica (L.) Karst.
Spice Bush		Lindera benzoin, Blume	Benzoin Benzoin (L.) Coulter.
Squirrel Corn		Dicentra Canadensis, D. C.; Corydalis Canadensis, Goldie	Bicuculla Canadensis (Goldie) Millsp.
White Mustard	Sinapis alba	Brassica alba (L.), Hook. fil. et Thomp.	Sinapis alba L.
Horse-radish		Nasturtium Armoracia, Fries.; Cochlearia Armoracia, L.	Roripa Armoracia (L.) Hitchcock.
American Ipecac		Gillenia stipulacea, Nutt.	Porteranthus stipulatus (Muhl.) Britton.
Smoke Tree		Rhus Cotinoides, Nutt.	Cotinus Cotinoides (Nutt.) Britton.
Virginia Creeper		Ampelopsis quinquefolia, Michx.	Parthenocissus quinquefolia (L.) Planch.
Evening Primrose		Œnothera biennis, L.	Onagra biennis (L.) Scop.
Fennel	Fœniculum	Fœniculum capillaceum, Gilibert	Fœniculum Fœniculum (L.) Karst.
Marsh Rosemary		Statice Limonium, L.	Limonium Carolinianum (Walt.) Britton.
Spearmint	Mentha Viridis	Mentha viridis, L.	Mentha spicata, L.
Dandelion	Taraxacum	Taraxacum officinale, Weber	Taraxacum Taraxacum (L.) Karsten.

[1] Simply a correction of spelling. Polygala senaga likewise replaces Polygala senega for the same reason.

Deviation in Development Due to the Use of Unripe Seed.

Prof. J. C. Arthur, *The American Naturalist*, September, 1895, p. 804, regards *maturity* as applying to the seed as a whole and *viability* to the embryo, the physiological processes associated therewith being quite distinct. The author shows from personal experiments, as well as from recorded work of others, that considerable number of seed from unripe fruit will germinate so that viability precedes maturity. The writer holds that a seed is simply a young plant, enclosed in a protective covering, and accompanied by surplus nutriment. The resting condition of a seed is not essential to germination, but is purely incidental and designed to aid in distribution.

The seed and sometimes the associated parts of the fruit will continue to develop under circumstances which put a stop to all growth in the vegetative parts. This phenomenon is known as after-ripening. There are marked deviations from normal development in plants from immature seed. The seedlings are weaker, the rate of germination is generally slower and the plant is less able to withstand unfavorable conditions. In plants from green seeds there is an increase in the number of fruits, but they are smaller. This tendency is said to have been practically applied by Von Mons to the raising of apples, in order to check too vigorous growth and to increase fruitfulness. Plants from unripe seed have the advantage of ripening their fruit earlier. It was pointed out by Goodale, in 1885, and since by Goff, that some early market varieties of vegetables indicate that they have been originated through the use of green seed.

Vegetal Dissemination in the Genus Opuntia.

J. W. Toumey, *Botanical Gazette*, August, p. 356, calls attention to the persistence with which these plants retain moisture. A thick epidermis, with small sunken stomata and evaporating surface reduced to a minimum by their condensed form, enables them to remain green for months, even when exposed to the dry and scorching heat from the southwestern plains. Half of one of the segments of *O. basilaris* placed in a small box, without either soil or moisture, produced a slender branch 5¼ inches long, having lost only 15 per cent. of its total weight in that time. This branch subsequently developed a second branch for about 2 inches in length before drying up. If these segments fall to the ground

even in the driest season of the year, the contained moisture is sufficient to enable them to put forth roots, a new plant resulting.

The function of the spines in the Cactaceæ has been generally asserted to be largely for protection; the writer claims that the cylindrical opuntias depend largely for dissemination upon the readiness with which the branches break off and upon the highly developed barbed spines. The flat opuntias are nearly all smooth, but here the usual habit is prostrate or semi-prostrate, so that the branches bending or creeping take root at the joints. The young branches of the plato-puntia are likewise more easily detached. This appears to be the prevailing method of dissemination, so much so that several species have almost lost the power of seed production, and even in species not sterile, owing to the unfavorable climate, the seed seldom germinate.

Development of Vegetable Physiology.

This vice-presidential address of Professor J. C. Arthur, before Section G, of the A. A. A. S., at the Springfield meeting in August, is published in the *Botanical Gazette*, September, p. 381, and will repay careful perusal. Physiology deals with what plants do, their methods of activity, their behavior; while the other divisions of botany treat of what plants are or have been, their form, structure and relation of parts.

Only the vaguest notions are current regarding the nutrition of plants, the uses of the leaves, the movements of sap, the purposes of color, and the means by which new positions are assumed. This ignorance is primarily due to the fact that almost nothing can be learned of the functions of plants from direct observation.

Vegetable physiology, as the term is generally employed, is not a homogeneous science. The most obvious distinction to be made in the physiological aspect of organisms is in regard to their maturity. In the embryonic or juvenile condition, it manifests peculiarities of the highest import, quite unlike those of the adult. The physiology of reproduction belongs here, and includes not only a study of the formation and increase of the young plants, that is, embryology, but genesiology as well, that is, the philosophy of the transmission of qualities and powers from the parent to the offspring. Vines has recently called attention to the fact that even vegetative reproduction, as in the case of the growth of a plant from a cutting, brings about rejuvenescence of the protoplasm, the new individual showing the characters of youth and not of maturity.

The author adopts the term "Caliology" for the physiological study of the cell, including both its reproductive and vegetative aspects. The activities of the plant may be considered from two standpoints: that of the plant's individual economy and of the plant's social economy, or its relation to other plants and animals and the world at large. The inappropriateness of the terms biology and phytobiology, to the study of the latter division, is referred to. Ecology is the term which has been proposed almost simultaneously in America and in England, for the study of the external or sociological economy of the adult plant. The approved tendency is to restrict the usage of the term "vegetable physiology" to the consideration of the internal or individual economy dealing with the most vital problem of how the individual lives.

Nature and Life History of Starch Grains.

In the *Botanical Gazette*, October, p. 458, D. T. MacDougal reviews the work of Arthur Meyer,[2] which modifies materially the accepted views on these subjects. According to this investigator, starch grains are true sphere crystals, in every way analogous to the sphere crystals of inulin, and are composed of two forms of amylose and a trace of amylodextrin. In an anomalous form, which colors reddish-brown with iodine, the proportion of amylodextrin is very large. This red starch is characteristic of a large number of saprophytes, but has been found in less than a score of the higher green plants. Meyer finds that the action of diastase on starch is a purely katalytic process, and in every way analogous to the katalytic action of acids, except that it is more easily influenced by external conditions, such as heat, etc.

The validity of the observations upon which is based Nageli's hypothesis as to the growth and structure of starch grains, is denied in toto. The grains have their origin and growth entirely within chromatophores, where they are held as long as the cell is living. Growth consists of the superposition of new layers of materials on those previously formed. The layers are due to the periodic activity of the chromatophore. The contour is due entirely to the pressure exerted on the chromatophore by the cytoplasm, and the size depends upon the biologic relations of the plant. Thus, in

[2] Arthur Meyer, Untersuchungen über die Stärkekörner der höheren Pflanzen. Gustave Fischer, Jena, 1895.

rapidly germinating seeds, or in other structures where rapid solution of reserve material is desired, the grains are small, and easily fissured.

Vanillas of Commerce.

Mr. R. A. Rolfe has monographed the genus Vanilla, and the *Kew Bulletin* for August, p. 169, abstracts the historical and descriptive account of the species yielding the commercial fruits. Four species appear to yield all the vanillas of commerce, and two other species are indicated as worthy of experimentation in this connection.

Vanilla planifolia,[3] Andr., Bot. Rep., viii (1808), t. 538.—A tall climber, with very long, somewhat flexuose, succulent, green stems, and slender, flexuose or twining, white, aerial roots, opposite to the leaves. Leaves subsessile, oblong, acute or shortly acuminate, succulent, bright green, 4 to 9 inches long, 1½ to 2½ inches broad. Racemes axillary, 2 to 3 inches long. Bracts numerous, spirally arranged, oblong, sub-acute or obtuse, concave or conduplicate, 2 to 6 lines long, gradually diminishing upwards. Pedicels, 1½ to 2 inches long; green. Sepals and petals linear, oblong and obtuse; 2 lines long; light, glaucous green. Lip trumpet-shaped, a little shorter than the sepals and petals, of the same color, united to the sides of the column to near its apex, and then convolute around it; apex three-lobed, mid-lobe longer and retuse, margin revolute and denticulate, nerves carinate, and those in front densely crenulate, verruculose, buff yellow; disc with a tuft of retrorse hairs about the middle. Column clavate; 1⅛ to 1¼ inches long; hairy on the face. Capsule elongated linear, obscurely trigonous; 6 to 9 inches long; 6 to 7 lines broad.

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[3] As Salisbury's name, *Myobroma fragrans*, antedates that of Andrews, it is apparent that, if the law of priority be here applied, the correct binomial would be *Vanilla fragrans* (Salisb.). There were at least four binomials applied by earlier authors; but as several species were in each case confounded under the same name, it is difficult to decide positively which of these yet older names should be retained for this species. If, however, we accept the determinations of Rolfe, that these names in part referred to this species, and adhere to the priority rule, the synonomy would appear to be:

Vanilla Vanilla (L.), 1753.
Vanilla Mexicana (Mill.), 1761.
Vanilla aromatica (Su.), 1799.
Vanilla fragrans (Salisb.), 1807.
Vanilla planifolia (Andr.), 1808. G. M. B.

Habitat, southeastern Mexico, in the Vera Cruz district, Misantla and Yucatan, also in British Honduras, Guatemala and Costa Rica. Cultivated in the Mascarene Islands, Java, the West Indies, and other parts of the tropics.

This species produces the true Mexican vanilla of commerce, which has been known ever since the discovery of America by the Spaniards, and which was described by Clusius as long ago as 1605, under the name of Lobus Oblongus Aromaticus. Its early history is much confused, as, for a long time, three or four species were confounded together, and, even when the present one was described, it was not known as the source of the vanilla of commerce, which was then, and for a long time afterwards, thought to be the *V. aromatica*, Sw. (*i. e.*, *V. inodora* Schiede). It was introduced to cultivation about 1739, but was probably soon afterwards lost. The Marquis of Blanford reintroduced it about the beginning of the present century, and it flowered in the collection of the Right Hon. Charles Greville, at Paddington, in 1807, whence it can be directly traced to various continental gardens, to Java, where Blume redescribed it under the name of *V. viridiflora*, and to Réunion, thus originating the present industry in that island. Salisbury's *Myobroma fragrans* (1807)[3] was drawn from the same individual as the original *V. planifolia*, Andrews. *V. sativa* and *V. sylvestris*, of Schiede, are chiefly known by the original descriptions, but are evidently forms of the same species, differing only in the length of the fruit; the former being a cultivated race, and the latter a wild original.

Vanilla pheantha, Rchb. f.—General habit of the preceding. Bracts fewer and larger, broadly elliptical-oblong, sub-obtuse; 3 to 7 lines long, 2 to 4 lines broad. Flowers larger; pedicels green. Sepals and petals, 2¼ to 2¾ inches long; greenish-yellow. Lip greenish-yellow, whitish in the throat, apex obscurely three-lobed and nearly truncate, nerves not carinate in front, disc with a pair of hairy lines extending from the central tuft of hairs towards the base, Capsule linear-oblong, obscurely compressed; 3 inches long, ½ inch broad.

Habitat, West Indies, Cuba, St. Vincent, Trinidad. This is an indigenous species which has been confused with *V. planifolia*, Andr., though it is easily distinguished by its much larger flowers, lip without verrucose disc, and its much shorter fruit. It is cultivated

in the Botanic Gardens of Jamaica and Trinidad, but there is no evidence of its fruit being of any commercial value.

Vanilla Pompona Schiede.—General habit of *V. planifolia* Andr, but leaves large, 6 to 11 inches long, 1½ to 4½ inches broad. Bracts larger and rather more fleshy; pedicels yellow-green; sepals and petals 3 to 3½ inches long, greenish yellow. Lip bright yellow, nerves somewhat thickened, central tuft consisting of descending imbricated scales rather than hairs. Capsule linear-oblong, strongly trigonous, 6 to 7 inches long, 1 to 1¼ inches broad. Habitat, southeastern Mexico, Papantla and Colipa, valley of the Cordova, Nicaragua, Panama, Columbia, Tolima, Venezuela, Trinidad, British Guiana, Surinam, Cayenne. Cultivated in Martinique, Guadaloupe and possibly other localities. This species is much more widely diffused than *V. planifolia*, and its fruit has long been known as an article of commerce, being now usually sold under the name of West Indian Vanillons. It is the "Grosse Vanille" of Aublet, the "Baynilla de acguiles" of Humboldt, and the "Baynilla Pompona" of Schiede. The pods are more difficult to dry, and they fetch a much lower price in the market.

Vanilla Gardneri Rolfe.—Stems fleshy thick; leaves subsessile, oblong, obtuse, fleshy; raceme short, thick; bracts ovate obtuse, rigid, prominent; sepals petal-like, linear, lanceolate sub-obtuse; lip oblong sub-entire, faintly submembranaceous, nerves scarcely thickened; disc subpubescent crested, column clavate, capsule unknown. Habitat, Brazil, in dry, rocky places, Paranagua, Natividade, Pernambuco, Para. A species allied to *V. Pompona*, Schiede, but with leaves about half the size, longer racemes, with smaller not reflexed bracts, and rather smaller, more membranous flowers. Gardner confounded it with *V. planifolia* Andr., and remarked: "This is the plant which yields the vanilla in Brazil, though, unfortunately, his specimens are without fruit. There are pods in the Kew museum labelled 'Brazilian or Bahia Vanilla,' which are 5½ inches long by fully 1 inch broad, fleshy and distinctly triquetrous, and thus approaching those of *V. Pompona*, but with a rank odor. These are probably produced by the present species. *V. appendiculata*, Rolfe, is indigenous to British Guiana. The fruit is aromatic, but it is uncertain if it has any economic value."

V. odorata, Presl, of Ecuador, Guayaquil, is only known from description. Presl remarks that, although fruits had been collected thirty-six years, they still retained their aromatic fragrance.

A False Chiretta. J. S. Ward, in the *Pharmaceutical Journal*, September 7, 1895, describes a false chiretta, which had been offered in the English market by a broker. The loose bundles resembled a parcel of dried broom tops. Each plant was complete, root and stem being perfect; the branches slightly broken, the leaves mostly absent. Intermixed were some extremely slender stems, panicles of pedicellate flowers, corolla and calyx, and glandular hairs; a few leaves only could be found, which were slender and much broken. The stems are from 1/8 to 1/4 inch in thickness, near the base woody, quadrangular, furrowed, smooth, slightly knotty at the points from which the branches spring. The longitudinal furrows are continued through the roots, which have numerous fine radicles. The leaves are opposite, decussate; branches erect or forming an acute angle with the stem, terminal shoots extremely slender. The whole is a little more than 2 feet in length. The origin proved to be *Andrographis paniculata*, Nees. This plant belongs to the order Acanthaceæ, and is described by Hooker as indigenous to a large portion of India. It is known there as Indian Chiretta.

Novel Uses of a Smut. An interesting Ustilago on *Zizania latifolia* is described by P. Hennings, in Hedwigia. It is sold in the markets of Tonkin as a vegetable. Japanese women are said to color the eyebrows and hair with the spores mixed with oil. These are likewise mixed with lac to produce rusty-colored wares.—*Botanical Gazette.*

Ipoh Poison. The Sakais living in the plains employ the *Antiaris* poison; the Sakais of the hills use a poison prepared from three hill plants called *Ipoh Aker*, *Prual* and *Lampong*. Dr. Stapf has determined that the Ipoh Aker is probably from a new species of *Strychnos*, closely allied to *S. maingayi*. Prual is from a Rubiaceæ, the *Coptosapelta flavescens*, Karth. An examination of the root bark, by Dr. Ralph Stockman, indicates that in future it must be classified among the poisonous plants.—*Kew Bulletin*, June and July, 1895.

THE CHEMISTRY OF RHUBARB.

By Dr. J. Oswald Hesse.

Reprinted from the *Pharmaceutical Journal*, October 19, 1895.

According to the investigations of Schlossberger and Döpping,[1] rhubarb contains, in addition to three resins—aporetin, phaeoretin and erythroretin—as an essential constituent, chrysophanic acid, which was, on the basis of its properties and analysis, declared by them to be identical with the chrysophanic acid which had previously been obtained by Rochleder and Heldt from the yellow lichen, *Physcia parietina*.[2] This chrysophanic acid of rhubarb was subsequently observed by Warren de la Rue and Hugo Müller, in a sediment from rhubarb tincture which had been kept for a long time, and they showed how this substance could be prepared from rhubarb by means of benzene.[3] They adopted the name of chrysophan, as the substance has not the character of an acid, but their proposal has not been generally followed. These observers also obtained another constituent of rhubarb, viz: emodin; to which they gave the formula $C_{40}H_{30}O_{13}$, representing chrysophan or chrysophanic acid by the formula $C_{10}H_8O_3$, which had been adopted by Rochleder and Heldt for the chrysophanic acid of *Physcia*.

Meanwhile, Gerhardt had suggested that the formula of chrysophanic acid should be $C_{14}H_{10}O_4$, and that it was in some way related to alizarin. At the instigation of Rochleder, the chrysophanic acid of rhubarb was then further investigated by Pilz,[4] who confirmed the results obtained by Schlossberger and Döpping, and concluded that the formula suggested by Gerhardt was incorrect. In a subsequent investigation, however, Rochleder[5] obtained results perfectly in accordance with Gerhardt's formula, and he explained this difference as being due to the circumstance that the substance cannot be dried at 100° C., but is rendered anhydrous only when heated to 115° C. in a current of carbonic anhydride. Still later, this formula was found to be incorrect, when Liebermann and O. Fischer[6] showed that the sublimed substance has the formula

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[1] *Annalen der Chem. Pharm.*, 50, 213.
[2] *Ibid.*, 48, 12.
[3] *Chem. Soc. Quart. Journ.*, 10, 300.
[4] *Chem. Centralbl.*, 1862, p. 6.
[5] *Berichte*, 2, 374.
[6] *Ibid.*, 8, 1102.

$C_{15}H_{10}O_4$, and that it is closely related to emodin, for which the formula $C_{15}H_{10}O_5$ was deduced by Liebermann[7] from his own analyses, as well as from those of De la Rue and Müller.

According to Kubly,[8] chrysophanic acid exists only in very small amount in fresh rhubarb, but is produced by the alteration of a glucoside, to which he gave the name of chrysophan. Proctor[9] has also observed a formation of chrysophanic acid in rhubarb under the influence of exposure to air in contact with water and caustic alkali.

Schroff[10] considers that chrysophanic acid is the active principle of rhubarb. However, the substance with which Schroff operated was not the chrysophanic acid of rhubarb, but that of *Physcia*, and, moreover, it was not pure. On the other hand, v. Auer[11] experimented with the chrysophanic acid of rhubarb, and found that it had no action upon the intestinal canal. According to his results, the purgative constituent of rhubarb is still unknown.

In prefacing the account of my investigation with these remarks, I must also state that it was undertaken in consequence of the observation[12] that the composition of chrysophanic acid obtained from *Physcia parietina* is not represented by the formula $C_{15}H_{10}O_4$, which has been found by Liebermann and Fischer to represent the sublimed chrysophanic acid of rhubarb. Rochleder's statement that the chrysophanic acid of rhubarb loses some water at 115° C., suggested the possibility that at the temperature of sublimation there might be a further elimination of water, and that the sublimed substance might be a product of condensation. It appears, however, from my investigation of the subject, that neither the statements of Rochleder and Heldt relating to the composition of chrysophanic acid from *Physcia*, nor those of Schlossberger and Döpping, De la Rue and Müller, or Pilz and Rochleder, in reference to the chrysophanic acid of rhubarb, are correct, but I have been able to confirm the results of Liebermann and Fischer. Moreover, the chrysophanic acid of *Physcia* is not identical with that of rhubarb, and the opinion expressed by Schlossberger and Döpping that these

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[7] *Berichte.*, 8, 970.
[8] *Neues Rep. für Pharm.*, 17, 216.
[9] *Pharm. Journ.* [3], 25, 233.
[10] *Vierteljahresch. für Pharm.*, 5, 269.
[11] *De Rad. Rhei.* Dorpat, 1859.
[12] *Liebig' Annalen*, 284, 177.

substances were identical, may be ascribed to impurity of the material in their hands.

In a previous paper I have described the chrysophanic acid of *Physcia* under the name of physcion, and as having a composition represented by the formula—

$$C_{16}H_{12}O_5 = C_{15}H_7O_2(OH)_2(OCH_3).$$

The composition of the chrysophanic acid of rhubarb is represented by the formula—

$$C_{15}H_{10}O_4 = C_{15}H_8O_2(OH)_2.$$

and I propose retaining for it the name chrysophanic acid, although the term is incorrect, because this substance does not possess the characters of an acid, as has been already pointed out by De la Rue and Müller.

The material operated upon in this investigation was Chinese rhubarb; one pound in a state of fine powder was digested with five times its weight of ether in a glass flask, and frequently shaken during ten days. The ether solution was then poured off, filtered and distilled, the distillate being returned to the partially exhausted rhubarb. By repeating this treatment several times until, in the course of three months, ten successive portions of extract had been obtained, the rhubarb powder was still only imperfectly extracted; it had a grayish yellow color and became red upon the addition of caustic potash solution, probably owing to the presence of some rhein.

The somewhat considerable quantities of ether extract obtained as residues assumed a crystalline condition on cooling. When treated with cold 80 per cent. alcohol a dark brown solution was formed, and a pulverulent crystalline substance remained undissolved. On spontaneous evaporation the solution left an amorphous residue containing paler colored crystalline particles consisting of crystals of a colorless substance and a residue of chrysophanic acid. These crystals could be separated by further treatment of the residue with weak alcohol, and in that way a solution was obtained which left, on evaporation, a perfectly amorphous dark brown residue, possessing in a high degree the purgative property of rhubarb. The alcoholic solution of this substance has a bitter and somewhat acrid taste, when boiled with hydrochloric acid it did not yield either chrysophanic acid or sugar. This extract contained almost

the whole of the active constituent of the drug, and consequently that does not appear to be of the nature of a glucoside. The resinous character of this substance, however, deterred me from undertaking any further investigation of it, and I proceeded to examine the above-mentioned crystalline powder, which consisted essentially of chrysophanic acid, emodin, and a new substance, rheïn.

I. CHRYSOPHANIC ACID.

The crystalline residue separated from the extract was repeatedly treated with a dilute solution of potassium carbonate at a temperature of about 40° C., in a vessel from which air was excluded, until a solution was eventually obtained which did not become sensibly red-colored within twenty-four hours. The undissolved portion of the powder was then dissolved in alcohol or glacial acetic acid and recrystallized until the melting point of the crystals was 178° C.

Pure chrysophanic acid does not dissolve at the normal temperature in a water solution of potassium or sodium carbonate. On boiling, a little is dissolved, forming a red solution, from which the greater part of the chrysophanic acid is again deposited on cooling. But the solution still remains colored red, probably indicating that some part of the chrysophanic acid has, under the influence of exposure to the air, been converted into emodin, the substance most nearly related to it, with which it is associated in rhubarb. Chrysophanic acid is quite insoluble in a water solution of potassium or sodium bicarbonate. When crystallized from alcohol or glacial acetic acid it forms golden-yellow laminæ, resembling moss in their arrangement; these crystals melt at 178° C.; they are not hygroscopic, neither do they lose water when heated to 115° C., or at higher temperatures. The composition of chrysophanic acid is represented by the formula $C_{15}H_{10}O_4$.

	Calculated.	Found.
Carbon	70·86	70·81
Hydrogen	3·93	3·87

When chrysophanic acid is treated with hydriodic acid (1·7 sp. gr.) no alkyl iodide is formed, but the substance is converted by reduction into chrysophan-hydro-anthron, $C_{15}H_{12}O_3$, which dissolves in the alkaline liquid with a wine-red color, but apparently is not again converted into chrysophanic acid on shaking the solution with air. In this particular there is a difference between this sub-

stance and the chrysophan-hydro-anthron prepared in a different way by Liebermann;[13] but I am disposed to think that the difference is due to some accidental circumstance.

2. EMODIN.

This substance is dissolved, together with rhein, by the solution of potassium carbonate, with which the pulverulent residue is treated in separating chrysophanic acid. The solution acidified with hydrochloric acid was shaken with ether, and, on evaporating the ether, a residue was left consisting essentially of emodin and rhein. By treatment with boiling toluene, emodin is extracted from the residue, and most of it is deposited again as the solution cools; on evaporating the toluene, a further small portion of emodin is obtainable, which may be conveniently put aside for further treatment with toluene. The crystals first deposited were then dissolved in hot glacial acetic acid, and the solution mixed with boiling water until crystallization commenced, the emodin then separated in well-defined, orange-colored prisms containing one molecule of water, which is given off at 120° C., the crystals then becoming dull.

	Calculated for $C_{15}H_{10}O_5+H_2O$.	Found.
H_2O	6·25	6·30

	Calculated for $C_{15}H_{10}O_5$.	Found.
Carbon	66·67	66·35
Hydrogen	3·70	3·93

Anhydrous emodin melts about 250° C. It dissolves readily in a cold water solution of potassium or sodium carbonate with purple-red color; very readily in caustic potash or soda. It also dissolves readily in ammonia solution, and, on addition of lead acetate, a flocculent, amorphous, purple-colored precipitate is formed. Emodin is freely soluble in alcohol, especially with the aid of heat, and the solution has an acid reaction. When treated with hydriodic acid (1·7 sp. gr.) in Zeisel's apparatus, there is not any formation of methyl iodide, as might be expected; but, on the contrary, emodin is reduced in the same manner as chrysophanic acid, chrysophan-oxyhydro-anthron, $C_{15}H_{12}O_4$, being produced. On recrystallizing this product from hot glacial acetic acid, it forms pale yellow shin-

[13] *Berichte*, 21, 436.

ing laminæ, which melt between 230° and 240° C., and become dark-colored.

	Calculated for $C_{15}H_{12}O_4$.	Found.
Carbon	70·36	69·59
Hydrogen	4·68	4·94

The formation of this product from emodin is represented by the equation;

$$\left.\begin{matrix} C_{15}H_{10}O_5 \\ 4HI \end{matrix}\right\} = \left\{\begin{matrix} C_{15}H_{12}O_4 \\ H_2O + 4I \end{matrix}\right.$$

3. RHEÏN.

In treating the mixture of emodin and rheïn with hot toluene, the rheïn remains undissolved, and may then be purified by recrystallization from hot glacial acetic acid. It forms microscopic yellowish-brown scales, is only sparingly soluble in hot or cold alcohol, almost insoluble in toluene, benzene, ether or cold glacial acetic acid, and is but slightly soluble in the boiling acid. When heated to 280° C. it does not undergo any alteration; considerably above that temperature it melts and is decomposed, forming a black liquid. Rheïn is quite insoluble in water; its alcoholic solution is distinctly acid. At the normal temperature it dissolves readily in caustic potash or soda, also in solution of potassium or sodium carbonate, with a deep purple-red color. When a solution of rheïn in potassium carbonate is mixed with solid potassium carbonate a compound of rheïn with potassium is separated as an amorphous purple mass. Rheïn also dissolves in a solution of potassium or sodium bicarbonate, but not so rapidly as in a solution of neutral carbonate. It dissolves also with purple color in ammonia, and the solution forms flocculent amorphous precipitates of a purple color on addition of lead acetate, agentic nitrate, or barium chloride.

When a solution of rheïn in caustic alkali or in other basic solvents is mixed with hydrochloric acid the rheïn is separated in a colloid condition, and from very concentrated solution it presents the appearance of a translucent, slimy mass. When these solutions are boiled with excess of hydrochloric acid the rheïn soon assumes the sparingly soluble crystalline condition above described. In the colloid condition rheïn is much more soluble in ether than the crystalline substance. It has a sweetish acid taste, and does not appear

to possess any purgative property. The composition of rheïn is represented by the formula $C_{15}H_{10}O_6$.

	Calculated.	Found.
Carbon	62·93	62·95
Hydrogen	3·49	3·54

By treatment with hydriodic acid (1·7 sp. gr.), rheïn does not yield any alkyl iodide, but it appears to undergo alteration in the same manner as chrysophanic acid and emodin. The immediate product thus obtained was very probably chrysophan-dioxy-hydroanthron; it was a pale yellow crystalline product, but I was unable to obtain it in a condition fit for analysis by recrystallization from glacial acetic acid, as the solution gradually became dark-colored, and deposited an unpromising semi-crystalline powder.

When rheïn is heated to 85° C. with a large excess of acetic anhydride for several days, it is gradually converted into a pale yellow crystalline powder consisting of minute scales, which melt between 262° and 265° C., after previously softening. This derivative of rheïn is very sparingly soluble in hot glacial acetic acid or in hot alcohol, but it dissolves readily in water solutions of potassium carbonate or caustic potash. These solutions have an intense purple color. When the potash solution is heated for some time, the product of acetylation is reconverted into rheïn and acetic acid according to the equation—

$$\left.\begin{matrix} C_{15}H_8(C_2H_3O)O_6 \\ H_2O \end{matrix}\right\} = \left\{\begin{matrix} C_{15}H_{10}O_6 \\ C_2H_4O_2 \end{matrix}\right.$$

A determination of the acetic acid so produced gave the following results:

	Found.	Calculated.
Acetic acid	14·1 p. c.	13·1 p. c.

Analysis of the acetylated substance gave:

	Found.	Calculated for $C_{15}H_9(C_2H_3O)O_6$.
Carbon	61·88	62·19
Hydrogen	3·94	3·65

When this product or rheïn is heated to 190° C. for five hours with acetic anhydride in a sealed tube, further acetylation takes place, and diacetyl rheïn, $C_{15}H_8(C_2H_3O)_2O_6$, is produced. This compound was obtained in the form of small greenish-yellow needles; it dissolved more readily in glacial acetic acid or in acetic anhydride

than the mono-acetyl derivative, especially on heating, and was to some extent soluble in dilute acetic acid. It was readily soluble, also, in potassium carbonate solution, caustic potash, or ammonia, and with purple color. On heating in potash solution, rheïn and acetic acid are reproduced according to the equation—

$$\left.\begin{matrix} C_{15}H_8(C_2H_3O)_2O_6 \\ 2H_2O \end{matrix}\right\} = \left\{\begin{matrix} C_{15}H_{10}O_6 \\ 2C_2H_4O_2 \end{matrix}\right.$$

Diacetyl-rheïn melts at 236° C. Analysis gave the following results:

	Calculated for $C_{15}H_8(C_2H_3O)_2O_6$.	Found.
Carbon	61·62	61·75
Hydrogen	3·78	3·60

It may be assumed that by longer continued heating, or by some other modification of the treatment, rheïn would take up two more acetyl groups with formation of tetracetyl rheïn.[14] Taking that assumption as well founded it would appear that rhubarb contains a series of substances the relations of which to each other may be represented by the following formulæ:

Chrysophanic acid	$C_{15}H_8O_2.(OH)_2$.
Emodin	$C_{15}H_7O_2.(OH)_3$.
Rheïn	$C_{15}H_6O_2.(OH)_2$.

It may probably also be inferred that these substances originate from a still unknown constituent of rhubarb by oxidation, and, in fact, Proctor considers there is reason for believing that after extracting rhubarb by means of benzene, chrysophanic acid is again formed on exposing the exhausted residue to the action of the air. The entire process of change would then be

$$\times O, \begin{matrix} \text{unknown} \\ \text{constituent,} \end{matrix} \rangle \text{ chrysophanic acid, } \rangle \text{ emodin, } \rangle \text{ rheïn.}$$

It must be noted, however, that Proctor does not say that he has actually obtained chrysophanic acid in the way suggested. As for Kubly's opinion in respect to the origin of chrysophanic acid, I consider that it is open to considerable doubt, and that his chrysophan was probably nothing else than impure rheïn.

It is well known that rhubarb frequently presents a streaked appearance, and it is stated that at one time red rhubarb was brought

[14] Owing to want of material, I have been unable to try this experiment.

into the market from China. I am of opinion that the red coloration in such instances may be due to emodin, and if that be the case an explanation might be found of the circumstance that Grothe[15] appears to have obtained only emodin in his examination of rhubarb, though he incorrectly took that substance to be chrysophanic acid. This substance does not crystallize in prisms, neither do the crystals contain a molecule of water as stated in regard to the substance described by Grothe.

It still remains to be ascertained whether the roots of different kinds of rheum are alike in containing the same constituents that I have obtained from Chinese rhubarb and described in this paper; also, whether there may be further distinctions between them and the constituents of roots of varieties of *Rumex*. In that respect v. Thann[16] was of opinion that he had proved the identity of rumicin and chrysophanic acid; but Rochleder subsequently raised a question as to the purity of the substances referred to. Moreover, at that time, pure chrysophanic acid was unknown, and it will now be desirable to renew the investigation of those varieties of *Rumex* in which it is said that chrysophanic acid has been found. In this connection I must not omit to mention that for some months past I have been engaged upon the investigation of the roots of *Rumex nepalensis*,[17] a native of India, and that I have found they contain several substances, giving the characteristic reaction with caustic potash in common with the above-mentioned constituents of rhubarb, though they are certainly, like physcion, quite different substances. I intend in a future communication to deal with these substances more fully.

Queensland cherry, the fruit of an Euphorbiaceous plant (*Antidesma dallachyanum*, Baill.), is also known as the Herbert River cherry. The plant yielding it is a shrub or small tree, closely allied to *A. Ghæsembilla*, Gærtn., of the Eastern Archipelago and Ceylon. According to Bailey, "the fruit, which, in size, equals that of large cherries, is of a sharp acid flavor, resembling that of the red currant, which it also equals when made into jelly. As the European fruit is placed among medicinal plants, on account of its juice being grateful to the parched palates of persons suffering from fever, this is worthy of a similar place."—*Kew Bulletin*.

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[15] Wiggers' "Pharmakognosie," 1864, p. 242, and *Chem. Centralbl.*, 1862, p. 107.

[16] *Annalen Chem. Pharm.*, 107, 324.

[17] For a supply of this material I am indebted to the kindness of Mr. D. Hooper, of Ootacamund.

A FEW REMARKS CONCERNING THE CASTOR-OIL BEAN.—RICINUS COMMUNIS, LINN.

By D. F. Davenport.

Read before the Meeting of the Georgia Pharmaceutical Association, Savannah, 1895.

Gentlemen of the Georgia Pharmaceutical Association:—You have made a request of me to write a treatise on a subject which very few of us this far South and East know much about. The experiments which have been made in my locality have been made at my expense, and the "returns," on account of the cold, and of imperfect knowledge of their culture, has resulted rather disastrously. Still there are many reasons to believe that South Georgia, and especially Sumter County, is admirably adapted to this "bean."

The experiments began by loaning out seed to the farmers in various localities in small lots, and giving a guarantee of a price per bushel delivered in any quantity at Americus, after September 1, 1894. Only one farmer made a return of the seed, and one other was so delighted with the enterprise that he made his own shipments to the Northern market, and this year he has a considerable acreage in their culture. With the others the continued frosts killed the young plants, and very few came to maturity.

Sufficient to say, however, the plant assumes an enormous size, and yields abundantly in this soil and climate. As to the character of the seed: one large crusher said that the specimen sent from Sumter County was the finest he ever saw, and that if we could grow beans like the sample sent he would give a contract for several thousand bushels.

Just at this time, however, the "Wilson Bill" took 50 cents duty off of castor beans per bushel, and the West Indies up to date has "out-classed" our section.

From meagre observations, however, I am sure that, if sufficiently understood and extensively cultivated, we have the advantage of that now rebellious district, even as it is.

One thing we must understand thoroughly, and that is their *cultivation.* All depends upon the knowledge of it. A few facts are given, gathered from the St. Louis market, which will be of great benefit to those who expect to engage in the enterprise in this locality.

Almost any soil that will produce wheat or corn will answer for the castor bean. When it can be had, a sandy loam is preferable. The soil should be dry. Wet, heavy soils are not adapted to its successful culture.

One important fact in connection with the culture of castor beans is that it is one of the most fertilizing crops raised. In this respect it surpasses even clover. Many farmers say, for fertilizing purposes, a crop raised upon poor land is worth several dollars per acre to the land, on account of the additional fertility gained by it.

PREPARATION OF THE SOIL.

The ground should be put in good condition for the seed, as for other crops. One thorough plowing, and three or four harrowings, with a heavy harrow, will be a sufficient preparation.

PLANTING THE SEED.

The ground is now laid off in rows, 5 or 6 feet apart, each way, except that between every sixth and seventh row, a distance of about 8 feet between the rows is left one way, to admit a horse and wagon or slide to pass, to take the beans when gathered. Hot water, somewhat below the boiling point, should be poured over the seeds, and they should remain in this water twenty-four hours before being planted. The temperature of the water will, of course, be gradually reduced to the temperature of the atmosphere. Applying the hot water once will be sufficient. If planted without this preparation, they are a great while in germinating, many of them not making their appearance for three or four weeks. With this preparation they will soon germinate and come up regularly. Some farmers put in each hill one-half of those which have hot water poured over them, and one-half those which have not; so that if the cut-worms destroy the first that come up, a stand may be obtained from the others, which will come up a week or two later. Good, sound, plump seed should be selected for planting. A bushel will plant fifteen to twenty acres. Eight or ten seed should be dropped in each hill. But one, or, at most, two plants are to be left in a hill. As the cut-worm is quite destructive to the plants, this number of seeds is recommended, so as to be certain of an even stand. Of course, replanting can be done; but it is better to avoid it, if possible, by planting plenty of seed. The seed should be planted as soon as all danger of frost is over. The plants are as

easily destroyed by frost as our common bean, and, therefore, planting should be delayed till after the 1st of April.

AFTER-CULTURE.

The cultivation of the plants consists in destroying the weeds and grass, and keeping the soil open and mellow. These objects are chiefly attained by using the horse and cultivator, or small plow, working between the rows both ways. It is also necessary to work among the plants with hoes, going over them two or three times, cutting the weeds away from the plants that cannot be reached with the plow or cultivator, and drawing a little mellow earth to the plants, gradually reducing the number to one plant in the hill, though two are occasionally left. One strong, vigorous plant, however, will produce better seed than two in the same hill, and as great a quantity of beans. After the plant is 2 feet high it is capable of taking care of itself, and grows rapidly. After heavy rains, however, it is still advisable to work between the rows with the horse cultivator, breaking up the crust that has formed on the surface of the ground, and opening and loosening the soil to derive a greater benefit from the atmosphere. It will be seen that the cultivation is as simple as that of corn or of the common bean.

HARVESTING THE CROP.

About the first day of July the beans begin to ripen. They are produced in pods or husks, on spikes of various lengths, and should be gathered as soon as the pods begin to turn brown, to prevent loss by their popping out on the field, as beans, when ripe, pop or burst from the pod quite a distance. They are gathered by cutting off the entire spike. Each plant has a number of these, and they are produced and ripen in succession till frost. Of course, only those exhibiting brown pods should be cut. These spikes are then thrown into a wagon or on a slide, passing through the broad rows, and hauled away to the

DRY YARD,

which is made on a piece of land near the bean fields, sloping to the south, so as to get as much heat as possible from the sun to ripen the beans and cause them to burst from the husks. Cut off the sod, then roll the ground down hard, and make a fence around the yard by placing boards up against rails laid on crotched sticks or posts; though the fence is not necessary if the yard is made large

enough to leave a space outside the beans of 12 or 15 feet, as many of the beans will pop that distance, and if the fence is not built, or the space left, many of the beans will be lost in the grass or field beyond the yard.

The spikes are occasionally turned over and exposed to the sun, until all the seeds have left the husks, when the old spikes are taken away and a new supply added. The same process is gone through with the entire crop. Great care should be taken to prevent the beans getting wet. Dirty beans command much less price, and sprouted beans are nearly worthless. When rain is anticipated, rake the spikes into a heap and cover them with straw, plank or tarpaulins; sweep the beans up, clean them with a fanning mill, and store in a dry place. Do not attempt to pop them out in pops over the fire, as it renders them almost worthless.

BOARD FLOORS.

It will undoubtedly pay most farmers to make board floors for their "dry yard" to "pop out" their beans on. In this way they can keep the beans perfectly clean and free from lumps of hard dirt and small stones, which cannot be taken out by a fanning mill or screens. Such a floor can be made cheaply in sections, say 8 feet wide and 16 feet long, by nailing rough boards planed on one side to 2 x 4 scantling set on edges, to allow air and rain to pass underneath. These sections can be easily moved by wagon. In case of rain the unpopped beans can be raked into one or more piles on part of the floor, and the other section used to cover them. When the bean season is over they can be used for other purposes, say storehouse for grain, etc., or shelter for animals, and the next season for dry yard floor, and so on. It will probably pay to paint the floor with cheap black paint; black "draws the sun," which will quicken the "popping out" process. The paint will preserve the wood and also prevent the rain from soaking into the floor, thus enabling the farmer to spread his beans again much sooner after the rain is over. No doubt the extra money received for the castor bean will soon pay the entire cost of the floor.

After the beans begin to ripen, the field should be gone over once or twice a week until frost. In hot, dry weather, they ripen more rapidly than in cool, wet weather. Children can perform this work, and a large family of children cannot be more profitably employed

than in taking care of a crop of castor beans. The work is all light. With a steady horse, children might do all the work.

FROSTED BEANS.

Are worth from one-half to two-thirds the price of good beans, but must never be mixed with them when sent to the market, as a very few frosted beans in a lot of good will reduce the value very much, from the inability to separate them economically.

YIELD, PRICE, ETC.

The yield will depend much upon the culture bestowed upon the crop, upon the season, and the care exercised in gathering and ripening the seed. From fifteen to twenty-five bushels to the acre is an average yield. Some cultivators will yield considerably more, others less. Farmers will do well to pay attention to this crop, for which a certain demand exists, and at remunerating cash prices. It will pay better than raising cotton, corn, potatoes, wheat, barley, or almost any other farm produce. It is not a difficult crop to get to market, can be taken by team, or sent by railroad, with more profit than most crops, as the value is greater for the same quantity.

Castor beans have proven a profitable crop. Present market price is $1.25 per bushel.

These directions for the cultivation of castor beans are intended to apply to our latitude. It is thought they are sufficiently explicit to enable any one to successfully attempt their culture.

We wish again to urge the farmers and dealers to thoroughly clean their castor beans before shipping to market. Well-cleaned beans will always bring more, and it is a disadvantage to all but the railroad company to pay the freight on dirt, chaff and hulls.

Castor beans weigh 46 pounds per bushel. The principal markets for us are New York City and St. Louis. The freight rate per 100 pounds in bags or barrels is 79 cents.

There are fixed charges for *inspecting* castor beans in bulk as follows: two dollars ($2.00) for every bulk car or part bulk car; two (2) cents per sack for every car sacks; three (3) cents per sack on less than carload lots, and that *no* inspection be less than twenty-five (25) cents.

GRADES OF CASTOR BEANS.

Prime Beans are such as are bright and uninjured, and weigh not less than forty-one (41) pounds to the measured bushel when cleaned.

Number 2 Beans are such as are bright and uninjured by rain, weight not less than thirty-eight (38) pounds to the measured bushel when cleaned, and shall be valued at five (5) per cent. less than the value of prime beans.

Rejected Beans are such as are slightly damaged by rain, and weight not less than thirty-eight (38) pounds to the measured bushel when cleaned.

No Grade Beans are such as are badly damaged by rains or damaged by frost, or weighed less than thirty-eight (38) pounds to the measured bushel when cleaned.

AMERICSU, GA.

THE EFFECT OF DIFFERENT TEMPERATURES IN THE EXTRACTION OF TANNING MATERIALS.[1]

BY J. GORDON PARKER, PH.D., AND H. R. PROCTER, F.I.C.

In this investigation the authors have endeavored to find what ratio the tannin[2] in various tanning materials bears to the coloring matter, and how the same is affected by extracting at different temperatures.[3] It will be found, on comparing our figures, that many tanning materials part with their tannin and coloring matter much more readily at about 60° C. than at higher temperatures, and that almost every one has its own peculiarities in this respect. To extract the tanning and coloring matters a suitable quantity of the tanning material in moderately fine powder was placed in a beaker, at the bottom of which was some pure silver sand, into which a syphon filter was inserted. The beaker was now put into a water-bath, and the material covered with distilled water and allowed to macerate for about sixteen hours, after which the bath was heated so that a thermometer inside the beaker reached the required temperature, and the extraction commenced; the liquor, as it syphoned slowly over, being replaced by water of the same temperature as that required for extraction, which percolated through the material, so that a litre was extracted in from two and one-half to three hours.

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[1] Abstracted by J. C. Peacock, from the *Journal of the Society of Chemical Industry*, July 31, 1895.

[2] "Tannin" is used throughout the paper in the sense of "tanning matters" absorbed by hide-powder.

[3] It will be apparent to the pharmaceutical reader, that what applies here to tanning materials may be equally true of many official drugs and their preparations, notably the infusions.—[*Ed.* AM. JOUR. PH.]

It was found that this was practically sufficient water to extract all the available tannin and color, very small additional quantities being obtained when, for experiment, a second litre was percolated at the same temperature.

The solution was now allowed to cool, filtered, analyzed, and measured in a half-inch cell by Lovibond's tintometer, and the results calculated for a half per cent. solution of tanning matter. The total colors are expressed numerically in terms of standard glasses. The analyses for tannin were made by the hide-powder filter method.

The method of extraction was in each case identical, so that the results obtained may be compared with one another, while, for the sake of accuracy, it was found necessary to make at least three extractions at each temperature, stating our results as the mean of the three analyses. Our first experiments were made with a somewhat poor sample of Belgian oak bark, 40 grammes of the ground material being extracted as described above, at each of the ten temperatures given in the subjoined table. Besides this, the following materials were estimated by working on decoctions made from 12 grammes—myrabolans, Smyrna valonia (beard), and Greek valonia (cup and beard); while from Natal mimosa (black wattle), sumach, quebracho wood and mangrove bark (species uncertain, but thought not to be Rhizophora mangle) decoctions were prepared representing 20 grammes of the material in the litre.

The results are tabulated in percentage of the highest amount of tanning and coloring matter obtained.

Scanning the table, it will be seen that all the available tannin cannot be extracted by cold water. In the case of oak bark a second litre was extracted at 15° and also at 50°, but they only resulted in getting less than another 0·25 per cent. out of the material, showing that the extraction had been thorough. It will be noticed that 38·1 per cent., or more than one-third more tannin, is extracted at 80°–90° than in the cold, but that the proportion of color to tannin has also increased 35·8 per cent. It may, therefore, be necessary, where color is a primary object, to continue to use cold extraction for oak bark, but it is well to realize that one-third of the tannin is then wasted.

With myrabolans the best results as regards tanning matter are obtained at from 90°–100°, whereas the maximum color is got by actual boiling. It is important to notice that the color is very little

Temperature of Extraction. Degrees C.	Oak Bark.		Myrabolans.		Smyrna Valonia.		Greek Valonia.		Natal Mimosa.		Sumach.		Quebracho Wood.		Mangrove Bark.	
	Tannin.	*Color.*	*Tannin.*	*Color.*	*Tannin.*	*Color.*	*Tannin.*	*Color.*	*Tannin.*	*Color.*	*Tannin.*	*Color.*	*Tannin.*	*Color.*	*Tannin.*	*Color.*
15	61·9	57·4	79·2	97·4	70·5	74·6	64·0	67·3	66·2	51·1	70·0	63·6	35·0	71·3	61·6	64·7
15–30	70·7	64·5	83·6	82·5	74·5	78·0	72·4	70·0	90·6	54·2	86·7	51·8	46·5	68·7	76·3	69·8
30–40	83·5	76·1	89·8	82·7	86·2	76·2	84·4	68·0	94·0	56·5	91·1	51·8	54·4	65·2	82·4	71·7
40–50	84·2	80·0	93·0	84·4	86·2	74·6	94·4	65·9	94·4	61·8	99·0	53·9	69·5	60·0	87·7	73·8
50–60	87·6	84·0	96·4	87·6	100·0	76·2	99·2	71·6	95·0	79·9	100·0	56·5	76·0	60·4	96·2	72·8
60–70	95·5	92·7	96·6	89·3	99·0	84·7	100·0	75·8	98·4	81·6	93·6	66·6	80·0	59·9	94·7	90·0
70–80	95·7	98·7	96·8	94·1	99·5	84·7	98·4	82·3	100·0	85·5	89·1	72·8	88·0	67·4	96·7	82·8
80–90	100·0	93·2	97·4	96·7	95·0	84·7	96·0	85·8	96·2	93·8	83·2	82·7	100·0	74·3	100·0	73·8
90–100	100·0	94·6	100·0	97·0	94·0	90·6	94·4	92·0	94·0	100·0	81·7	87·7	89·8	100·0	95·7	100·0
Boiled one-half hour .	93·7	100·0	98·1	100·0	90·6	100·0	88·8	100·0	91·8	98·4	74·8	100·0				

affected by the temperature, 97 per cent. of the total color being extracted by cold water, and the lowest amount of color in proportion to tanning matter being obtained at about 40°.

Smyrna valonia behaves in rather a peculiar manner. On increasing the temperature from 15° to 40°, the non-tannins were found to steadily decrease with a corresponding increase in the tannins, which points to a probable transformation of some anhydrides or glucosides into tannin. 50°–60° appears to be the best temperature for the extraction of this material, as at higher temperatures the proportion of color increases, and the tannin decreases. As would naturally be expected, the Greek valonia behaves in a very similar way to the Smyrna, and gives the best results between 60° and 70°. It, however, gives off its tannin more quickly than the Smyrna beard.

The maximum yield of tanning matter from sumach was found to be obtained at 50°–60°, while Messrs. Seymour, Jones and Palmer, who first drew attention to the matter, found it between 30° and 40°, a result which was confirmed by Mr. J. T. Wood. This difference may be due either to some peculiarity in our sample or to a difference in the manner of experimenting, and needs further inquiry. It seems probable, from the increase in non-tannins, corresponding to the diminished yield of tannin at higher temperatures, that some actual decomposition takes places. The extractions made over 60° were extremely difficult to filter, and, on standing, continued to deposit, whereas those extracted at a lower temperature remained quite clear.

It will be noted that, even in the case of quebracho wood, where heat is essential to good extraction, the maximum yield of tannin is obtained below 100°, while the color increases by over 25 per cent. between 90° and 100°. It is highly probable that in this case there is an actual conversion of some of the tannins into red anhydrides, similar to that which has been observed in other catechol tannins.

In the case of mangrove bark, the maximum yield of tannin is practically reached at 60°, while beyond this the tannin remains nearly steady, and the color increases very irregularly up to 100°. It was noted that above 40° the infusions became turbid on cooling, through deposits of difficultly soluble reds, and that over 60° they became very difficult to filter.

THE OCCURRENCE OF TRIMETHYLENE GLYCOL AS A BY-PRODUCT IN THE GLYCERIN MANUFACTURE.[1]

By Arthur A. Noyes and Willard H. Watkins.

During the past winter our attention was called to an unusual difficulty experienced by one of the soap-making firms in the neighborhood of Boston, in obtaining their glycerin of the required commercial gravity. The information furnished in regard to it indicated the presence in the glycerin of some uncommon impurity, and a considerable quantity of the "light stuff" having been generously placed at our disposal by the soap company, we were enabled to investigate it. It was submitted to fractional distillation, first at diminished and then at ordinary pressure, and a liquid boiling between 214° and 217° at 760 mm. pressure was thus separated from it. This liquid was found to have a specific gravity of 1·056 at $\frac{20°}{15°}$, and gave the following results on analysis:

0·2293 gramme substance gave 0·3998 gramme carbon dioxide and 0·2158 gramme water.

	Found.	Calculated for $C_3H_8O_2$.
Carbon	47·52	47·37
Hydrogen	10·46	10·53

The substance is, therefore, trimethylene glycol, which has a boiling point of 214° and a specific gravity, at $\frac{18°}{0°}$, of 1·0526. The isomeric propylene glycol boils at 188°-189°, and has a specific gravity of 1·0403 at $\frac{19·4°}{0°}$. The "light stuff" contained a very considerable proportion, about 38 per cent., of glycol.

The origin of the glycol is a matter of considerable interest. There is little doubt that it was produced by fermentation of the glycerin.

For it has already been shown by Freund[2] that trimethylene glycol is, in fact, one of the principal fermentation products of that substance. It is, moreover, highly probable that the glycol was present in the fat before saponification by the alkali, as the fermentation can hardly have taken place in the soap lye, both on account of its saline character, and on account of the short time intervening between the

[1] Read at the Springfield Meeting of the American Chemical Society, 1895, and printed in the Journal of that Society, 17, 890.

[2] Monatsh. Chem., 2, 638.

saponification and the recovery of the glycerin. It had probably been produced in the fat by spontaneous saponification and subsequent fermentation of the glycerin[1]. Refuse house fat formed a considerable part of the soap stock.

The presence of glycol in glycerin, used for making nitro-glycerin, might be a source of danger, since it reacts with nitric acid with explosive violence. Its presence would be detected in the usual examination by a low specific gravity accompanied by a high oxidation equivalent, as shown by the bichromate titration.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON, MASS.

A statement of *The Mineral Products of the United States* has been compiled by the Geological Survey at Washington, covering the calendar years 1885 to 1894.

The largest production of pig iron was in 1890, when it aggregated 9,202,703 long tons, valued at $151,200,410. The product in 1894 aggregated 6,657,388 tons, valued at $65,007,247. The largest production of silver was in 1892, when 63,500,000 troy ounces were reported, of the coinage value of $82,099,150. In 1894, the figures were 49,501,122 ounces, valued at $64,000,000. The largest production of gold was in 1894, when 1,910,816 troy ounces were reported, with a coinage value of $39,500,000. The next largest was in 1886, when the product was 1,881,250 troy ounces, valued at $35,000,000. In 1893, the number of troy ounces was less than the product of 1886 by 142,169 troy ounces, but the value was greater by $950,000. Aluminum shows the largest increase of any of the metals reported, having risen from 283 ounces in 1885, valued at $2,550, to 550,000 ounces in 1894, valued at $316,250. Tin does not appear until 1891, when 125,289 pounds are reported, valued at $25,058. A slight increase in tin product and value is shown in 1892, a decrease in 1893, and none is reported in 1894.

Bituminous coal product was largest in 1893, being 128,385,231 long tons. The product in 1894 fell off nearly 10,000,000 tons. Anthracite coal also had the largest output in 1893, being 48,185,306 long tons, valued at $85,687,078. In 1894, the product was 46,358,144 long tons, valued at $78,488,063.

The production of borax was largest in 1894, being 14,680,130 pounds, valued at $974,445.

The largest value of metallic products of all kinds was reached in 1892, when it aggregated $307,716,239. The same year showed the largest value of non-metallic minerals of all kinds, the amount being $339,900,715, the figures for 1894 being, respectively, $218,168,788 and $308,486,774.

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[1]Mr. E. Twitchell, of Cincinnati, informs us that he has found the glycol present in considerable quantity in the "tank liquor," separating from the fat before saponification.

EDITORIAL.

STATISTICS ON PEPPERMINT.

An item on the foregoing subject has been going the rounds of the daily papers, and, in order to verify it, a copy was mailed to the well-known Michigan peppermint grower, Albert M. Todd, who sent the following, which may well replace the above-mentioned clipping:

"Regarding the item, of which you sent me a copy, relating to peppermint culture, most of the statements are approximately correct. The yield of oil of peppermint in Michigan will be about 150,000 pounds this year. Ordinarily, about 350 pounds of half-dried American peppermint plants produce 1 pound of oil. The average yield per acre for a period of twenty years, for the first two years after planting, has been, I should say, about 12 pounds per annum. It has sometimes greatly exceeded this, and sometimes fallen short, on account of frost, drought, and other causes. The crop suffered greatly this year from the two causes mentioned, yet, owing to increased area planted, there was a good amount produced.

"I have not calculated closely the area under cultivation to peppermint this year, but would estimate both 'old' and 'new' crops combined to be from 12,000 to 15,000 acres.

"There was a greater quantity of inferior oil of peppermint produced this year than usual, since the 'old' crop was largely cut down by frost and drought, which permitted the growth of weeds, and, under careless cultivation in some localities, the quality was poor."

THE PHARMACEUTICAL REVIEW.

The *Pharmaceutische Rundschau*, of New York, which was founded thirteen years ago by Dr. Frederick Hoffmann, will appear on January 1, 1896, as the *Pharmaceutical Review*, and will, for the most part, be printed in the English language.

Dr. Hoffmann will not, for the present, entirely withdraw, but his name as editor will appear along with that of Dr. Edward Kremers, of the University of Wisconsin. The names of the following well-known pharmaceutical writers will appear on the title-page as co-operators: Professor Charles Caspari, Jr., Professor Charles O. Curtman, Professor J. U. Lloyd, Dr. Charles Mohr, Dr. F. B. Power, Professor A. B. Prescott, Professor William Simon.

The new journal will be issued by the Pharmaceutical Review Publishing Company, of Milwaukee, Wis.

In the thirteen years of its existence, the *Pharmaceutische Rundschau* has established a well-earned reputation for fearlessly expressing an opinion on the various pharmaceutical questions that have arisen, regardless of sentiment or policy. The *Pharmaceutical Review* will, no doubt, continue in this course, and, at the same time, publish some results of original research.

Dr. Hoffmann will sail for Europe about January 1, 1896, to obtain a year of much-needed rest and recreation. The winter will be spent in the mild climate of southern Europe.

THE PRESENT STATUS OF THE ANTITOXIN TREATMENT OF DIPHTHERIA.

In a recent issue of the *University Medical Magazine*, Vol. 8, p. 126, this subject is treated editorially, and, after giving a mass of statistics, the following conclusions are reached:

"A careful weighing of all the evidence submitted upon the subject up to the present time seems to establish the following facts: That antitoxin is a curative agent far more efficacious in diphtheria than any remedy heretofore employed; that its injection is very rarely followed by serious local disturbances, such as abscess, and, perhaps, never when the preparation is pure and employed under antiseptic precautions; that a marked improvement in both the local and general symptoms of diphtheria is noticeable within twenty-four to forty-eight hours after the injection of the serum; that the antitoxin has a decided influence in preventing the spread of the false membrane into the larynx and trachea; that the earlier in course of the disease the serum is employed the more favorable are the results; that it is distinctly more efficient in the fibrinous types of the disease than in the septic ones; that the liability to paralysis and albuminuria is not lessened by the use of serum, but probably somewhat enhanced thereby; that genuine nephritis, on the other hand, is less frequently observed in cases of diphtheria treated with antitoxin than with other remedies; that antitoxin may produce certain untoward symptoms, such as various cutaneous rashes, but that these are not serious in their nature and are unattended with danger to life; and that improvement in the methods of preparing the serum and more definite knowledge as to the manner of its employment have rendered the later reports even more favorable to its use than the earlier ones."

AN UNCALLED-FOR FLING.

The *Therapeutic Gazette* for November 15, 1895, contains an article by Leedom Sharp, LL.B., M.D., on "Opium Poisoning Treated with Caffeine," in which occurs the following paragraph, a part of which we have italicized:

"The length of time elapsing from the taking of the opium, which was in the form of Dover's powder—*compounded by the druggist hastily and carelessly, no doubt*—to the time he was given the caffeine was about two hours and a half."

This sentence, which was not constructed according to the long-established rules of Goold Brown or any other grammarian, is not, so far as the statement concerning the druggist is concerned, substantiated by any other part of the article, nor is it in accordance with the facts which are apparent to any one who will take the trouble to read the balance of the paper.

This heavily titled author first tells us that his patient was "aged twenty-seven; a medical student of marked mental attainments and in perfect health, but suffering from hay fever." How the patient could be suffering from hay fever and opium poisoning, yet be in perfect health, will probably not be quite clear to laymen; but we think we know what the author intended.

We then learn that the patient arrived at the physician's office at 5.30 A.M., two hours after he had swallowed fifteen grains of Dover's powder. Now if the stomach of that medical student "of marked mental attainments" was as it should have been at 3.30 A.M., it was empty, and any tyro in therapeutics knows that if the fifteen grains of Dover's powder had not produced a marked impression under those circumstances, the drug and druggist both might have been the subjects of some suspicion. But the drug was of the full strength and weight, and this heavily titled physician, without stopping to discuss that, says: "I gave him immediately nitro-glycerin, $\frac{1}{50}$ grain; tr. digitalis, 4

minims ; tr. strophanthus, 4 minims ; tr. belladonna, 5 minims," and, as if that were not enough, he "hurriedly administered 6 grains of caffeine." The result of this multifold treatment was the survival of the patient, in spite of adverse circumstances, and the enthusiastic physician sat down to write up the case in the most glowing terms. He gave all the credit to himself and the caffeine, and at the same time he hastily and carelessly endeavored to blacken the reputation of some unoffending pharmacist who had been doing his duty. The author, however, neglected to state that he administered the caffeine hypodermically ; we presume that was what he did ; but if he did not, the contribution has no excuse whatever for its existence, for caffeine, as the active constituent of infusion of coffee, has, for a long time, been successfully employed in opium poisoning.

Finally, this man of many titles did not state why this medical student "of marked mental attainments" was pouring medicine down his throat at 3.30 A.M., when he ought to have been in bed asleep ; he did not say whether the patient had been trying to increase the action of the Dover's powder by the free ingestion of hot drinks, and he did not even suggest what he would have done if his patient had not had "marked mental attainments."

We thought to extract a grain of comfort from the final paragraph, however, when we read that the patient "probably would have survived the ingestion of the fifteen grains of the powder," but we suddenly remembered that it is usually not the *ingestion* which kills ; he had survived that before he reached the doctor's office.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A TREATISE ON PHARMACY FOR STUDENTS AND PHARMACISTS. By Charles Caspari, Jr., Ph.G., with 288 illustrations. Philadelphia : Lea Brothers & Co. 1895. Pp. 679. Cloth, $4.50.

A new book on pharmacy is always a matter of considerable interest to pharmacists. This is the second one that has been issued within a year, besides the revised edition of a third one.

We are told in the preface that "the motive for writing this book was, in the main, to supply students of pharmacy with a text-book which, while sufficiently comprehensive to serve as a trustworthy guide, should be devoid of all unnecessary material, such as official and unofficial formulas, etc., readily accessible in the Pharmacopœia and such books of reference as are usually found in drug stores."

The book is divided into three parts : Part I comprises General Pharmacy. Part II treats of Practical Pharmacy. Part III is devoted to Pharmaceutical Chemistry.

Part I opens with a chapter on each of the following subjects : Pharmacopœias, Weights and Measures, Specific Gravity, Heat, Collection and Preservation of Crude Drugs ; then such operations as grinding, solution and percolation are considered. Part II considers the various classes of official preparations, like Waters, Infusions, Fluid Extracts, etc., and, after a general treatment of the group, the members are arranged alphabetically, and the composition of each is given. The chapter on Mixtures in this part contains

some pertinent remarks on incompatibility, which is considered pharmaceutically, chemically and therapeutically, and practically exhausts the subject. Part III is divided into inorganic and organic substances. The classification of the former is probably as good as could be devised in a strictly pharmaceutical treatment, but the author introduces the organic substances with a chapter on cellulose. We are aware that in doing this he has followed the practice of a number of pharmaceutical writers who have preceded him; but the classification is as unscientific as it is unaccountable, and belongs to the ideas existing in the early part of this century, that cellulose was a fundamental kind of matter. This order of treatment is all the more remarkable because cellulose is not of any great pharmaceutical importance, and one recent author has seen fit to omit it altogether from his work on pharmacy.

The various chapters in the organic part, are creditably presented, notably the one devoted to the alkaloids, in which an excellent brief description is given of the class in general, and of the more important individual members of the class.

As a whole, the book is a well-written, compact statement of the science of pharmacy, and will be found of value by students as well as by the general pharmacist. The typography, illustrations and whole make-up of the work are a credit to the publishers.

BULLETIN, VOL. II, NO. 4, College of Agriculture, Imperial University of Japan.

In this number Dr. Oscar Loew continues his contribution on *The Energy of the Living Protoplasm*, as previously noticed in this Journal (1894, p. 412, and 1895, p. 179); the special considerations this time being *The Chemical Activity of Living Cells and Respiration.* The other contributions in this number are: *On the Reserve Protein in Plants*, II, by G. Daikubara; *On the Consumption of Asparagine in the Nutrition of Plants, On the Assimilation of Nitrogen from Nitrates and Ammonium Salts by Phænogams, On the Presence of Asparagine in the Root of Nelumbo nucifera*, and *On the Occurrence of Two Kinds of Mannan in the Root of Conophallus konyaku*, by Y. Kinoshita; *Note on the Chemical Composition of Some Mucilages*, by K. Yoshimura; *The Preparation and Chemical Composition of Tofu*, and *Note on Nukamiso*, by M. Inouye; *Preliminary Note on Sake Yeast*, by K. Yabe; *Note on the Behavior of Hippuric Acid in Soils*, by K. Yoshimura; *Does Hydrogen Peroxide Occur in Plants*, by J. Cho.

APPENDIX TO DUNGLISON'S MEDICAL DICTIONARY. Lea Brothers & Co., Philadelphia, 1895.

This is a supplement to the twenty-first edition, and consists of twenty-five pages of the most recent medical terms. Many of the new remedies of synthetic origin are defined, and also many of those substances which were first made official in the U. S. P., 1890.

INDEXES TO THE LITERATURES OF CERIUM AND LANTHANUM. By W. H. Magee, Ph.D. Washington: published by the Smithsonian Institution, 1895. 8vo, 43 pp. From Smithsonian Miscellaneous Collections, Vol. 38 (Number 971).

INDEX TO THE LITERATURE OF DIDYMIUM, 1842-1893. By A. C. Langmuir, Ph.D. Washington: published by the Smithsonian Institution, 1894. 8vo, 20 pp. From Smithsonian Miscellaneous Collections, Vol. 38 (Number 972).

ON THE DENSITIES OF OXYGEN AND HYDROGEN, AND ON THE RATIO OF THEIR ATOMIC WEIGHTS. By Edward W. Morley, Ph.D. Washington: published by the Smithsonian Institution, 1895. 4to, 117 pp. From Smithsonian Contributions to Knowledge, Vol. 29 (Number 980).

The following from the announcement by Secretary Langley fully explains the scope of the work:

"The present memoir is the result of a series of investigations by Professor Morley, which have been aided to some extent during the past two years by the Smithsonian Institution.

"In his investigation, Professor Morley has studied the problem by two methods:

"(1) By the synthesis of water, in which he, for the first time, has achieved completeness by actually weighing the hydrogen, the oxygen, and the water formed, whereas all his predecessors took one or another of these factors by difference.

"(2) By the density ratio between oxygen and hydrogen. In this method he has weighed the gases of greater purity and in larger quantity than hitherto, and he has in some instances operated without the intervention of stopcocks, and therefore with no possibility of error due to leakage. He has also, as a correction to the density ratio, redetermined the composition of water by volume. By both methods he reaches the same result:

"O = 15·879, with variation in the *fourth* decimal place as between the two."

AN ACCOUNT OF THE SMITHSONIAN INSTITUTION: ITS ORIGIN, HISTORY, OBJECTS AND ACHIEVEMENTS. By G. Brown Goode. Washington, 1895. 38 pp.

Any one interested in the rise and development of the Smithsonian Institution cannot but be entertained by a perusal of this pamphlet.

PROCEEDINGS OF THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION. Eighteenth Annual Meeting, 1895. We believe that more original papers are printed in the proceedings of this association than in those of any other State in the Union, and, probably, we would not be far wrong to say, more than occur in the proceedings of all the other States combined. The present volume is fully up to the average in this respect, and it has been made attractive in other ways by the liberal distribution of illustrations through the book, of the scenery near the meeting place at Eaglesmere. The frontispiece is a portrait of the late Edward C. Jones.

PROCEEDINGS OF THE FLORIDA PHARMACEUTICAL ASSOCIATION. Ninth Annual Meeting, 1895. The most important paper in this volume is by Dr. J. B. Read, on the *History and Therapeutical Value of the Saw Palmetto.*

PROCEEDINGS OF THE GEORGIA PHARMACEUTICAL ASSOCIATION. Twentieth Annual Meeting, 1895. The most interesting and important paper of the volume is on *The Cultivation of the Castor Oil Bean*, which we reproduce in full, on page 624 of this issue.

PROCEEDINGS OF THE TWENTY-FIFTH ANNUAL MEETING OF THE NEW JERSEY PHARMACEUTICAL ASSOCIATION, held in Newark, 1895. The most notable paper is one on *The Pharmacology of Saw Palmetto*. By Henry H. Rusby, W. A. Bastedo and Virgil Coblentz.

PROCEEDINGS OF THE ELEVENTH ANNUAL MEETING OF THE MINNESOTA PHARMACEUTICAL ASSOCIATION, held at Lake Minnetonka, 1895.

PROCEEDINGS OF THE NEW YORK STATE PHARMACEUTICAL ASSOCIATION, 1895. The most important paper is on *Fluid Extract of Wild Cherry*. By George V. Dillenbach.

IN MEMORIAM, JOHN ADAM RYDER. Published by a committee of representatives from the American Philosophical Society, Academy of Natural Sciences, and the United States Commission of Fish and Fisheries. 28 pp.

A GUIDE TO THE ORGANIC DRUGS OF THE U. S. P., 1890. Compiled and arranged by John S. Wright. Presented to students of pharmacy by the Botanical Department of Eli Lilly & Company, Indianapolis, Ind. 118 pp.

FOSFATO LIQUIDO DI FERRO E CALCIO. Nota del Dottor G. Siboni. Reprint from *Bolletino Chimico-Farmaceutico*. September, 1895.

OXYHÆMOGLOBIN AND ALLIED PRODUCTS. Published under the direction of F. E. Stewart, M.D., Ph.G., director of the Scientific Department of F. Stearns & Co. Detroit, 1895.

This contribution is divided into three parts: Part I, Oxyhæmoglobin, Albuminate of Iron, and Peptonate of Iron, by F. E. Stewart. Part II, The Absorption of Iron in the Animal Body, by A. B. Macallum. Part III, The Hæmoglobins and Related Products of the Market, by Charles H. Williams.

ON THE TECHNICAL ANALYSIS OF ASPHALTS. By Samuel P. Sadtler, Ph.D. Reprinted from the *Journal of the Franklin Institute*, November, 1895.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, November 19, 1895.

The second regular Pharmaceutical Meeting was held in the Museum of the College. On motion, Mr. Joseph W. England was chosen chairman. The minutes of the previous meeting were adopted as published, with the exception of one correction which was made by Mr. Kebler. He said that the use of talcum, instead of calcium phosphate, in the official process for making the tincture of opium, does not interfere with the yield of morphine.

Prof. Trimble showed a sample of Acetum Opii, which was presented by Mr. G. H. Davis, of this city, and was made over thirty years ago by the U. S. Pharmacopœia of 1850. The clear liquid had been separated from the sediment, which was in large proportion, and which was thought to be composed principally of the aromatics used in the preparation. Prof. Trimble is having this analyzed, and will report on the percentage of morphine separated. Mr. England remarked that vinegar of opium has fallen into disrepute among physicians, which is probably to be regretted, as acetic acid is one of the best solvents for the alkaloid.

Prof. Trimble also showed a sample of Aloin which was presented by Mr.

C. H. LaWall, and one of genuine Turkey Rhubarb purchased in the London market in 1856, the latter being from Prof. Remington's cabinet.

Mr. England inquired which aloin the sample was, and Mr. LaWall said that it was a combination of the official aloins.

The chairman exhibited two Kola plants, which had been grown in the conservatory of the Philadelphia Hospital, through the courtesy of Superintendent Charles Lawrence, from seeds (both white and red), which he had procured from Messrs. Frederick Stearns & Co., and upon his invitation Prof. Bastin gave a description of the genus to which these plants belong. Prof. Bastin said that not much was known of these plants until 1865, or still later when Messrs. Heckel and Schlagdenhauffen published their investigation of them. They belong to the Kola acuminata or Sterculia acuminata, which is a member of the order Sterculiaceæ. The members of this order are mostly shrubs, but some are trees and some vines.

The genus Sterculia is indigenous to tropical Africa or the western Soudan, but now grows wild in Venezuela and the West India Islands, and has been naturalized in Australia and on the southeastern coast of Africa.

The plants are evergreen trees or shrubs. The leaves are acuminate and alternate, and those which are mature are smooth, while the younger ones are covered with a stellate pubescence which is a peculiarity of the Sterculia or Kola.

The flowers are yellow and form corymbose clusters. They have but a single floral envelope, which consists of a five-sepaled calyx, and are monœcious. Prof. Bastin also mentioned some other peculiarities of the plants, and then referred to some of the uses of the seeds.

In the Jamaica exhibit at the World's Columbian Exposition, preparations of Kola seed, made to resemble the commercial preparations of chocolate and cocoa, were shown. The commissioner in charge said that they were used instead of the more expensive preparations of similar character, and were more nutritious than chocolate and not inferior to it in taste.

Prof. Bastin thought that this latter statement, coming from an interested person, should be accepted with a grain of salt, but that it is altogether probable that this commodity will become an important article of commerce in the near future.

Mr. Procter wished to know of Prof. Bastin whether he considered the fresh seed superior to the dry for making the preparations, as is stated by some manufacturing firms, and remarked that he had gotten good results with the dry seeds. Prof. Bastin thought well to suspend opinion until further investigation of the subject had been made. Prof. Trimble said that the astringency is due to 2 or 3 per cent. of tannin which is not as great as that of tea. He also referred to the probable danger of the "kola habit," which may be attributed to the popularity attained by this drug through advertising.

Mr. Kebler then read a paper entitled *Tubular Crystals of Monobromated Camphor*, in which he described many peculiar forms of crystals, such as those of quartz and galena, and those obtained by artificial means or in the process of manufacture. Prof. Bastin also mentioned the peculiarity of the quartz crystal, and stated the fact that it usually contains a cavity and a vacuum bubble, the latter being dissipated at a temperature of 400° or 500°, and that this temperature is regarded as an indication of the temperature at which the quartz crystal was formed.

The next paper, on *Agar-Agar as a Base for Glycerin Suppositories*, was read by Prof. F. G. Ryan, and was the cause of considerable discussion. Samples of suppositories made with agar-agar, containing respectively 50 per cent. and 75 per cent. of glycerin, were shown, as was also a sample of agar-agar.

Mr. Procter said that he had found difficulty in the official process for this preparation and that he used twice the quantity of glycerin there directed, which gave a satisfactory product.

Mr. England recommended the use of anhydrous glycerin when the quantity is increased.

Mr. Beringer said that the heat of the water-bath is not sufficient in this operation, but that a low flame is to be preferred, and he further stated that he uses sodium bicarbonate instead of the carbonate which contains water of crystallization. He also recommended keeping the suppositories in a container having a paraffined cork, as cork alone is not impervious to moisture, and it is liable to stain the suppository unless protected in this way, or the difficulty may be obviated by placing paraffined paper underneath the cork.

Mr. Procter gave a suggestion in regard to dispensing them. His method is to dispense them in glass vials, each suppository having a string running underneath it for its removal from the vial. The string projects by the side of the cork, and they are both paraffined.

Several other practical points were brought out in the discussion, in which Messrs. Ryan, Beringer, Remington and England participated.

On motion of Prof. Trimble, a vote of thanks was tendered those who had presented specimens.

The papers were referred to the Publication Committee, and, on motion, the meeting adjourned.

T. S. WIEGAND,
Registrar.

The *Antidotes for Hydrocyanic Acid* have been recently discussed in a paper by Dr. John G. Spenzer, before the Cleveland Medical Society. Mechanical antidotes, as emetics and stomach tubes, are of no value, since enough time is lost in their application to allow of the absorption into the blood of a quantity of hydrocyanic acid sufficient to produce fatal results.

The Hungarian toxicologist, Johan Antal, has recommended cobaltous nitrate as an efficient antidote, which has led Dr. Spenzer to institute a series of experiments on rabbits and dogs. Cobalt salts appear to be poisonous in concentrated solution; one gramme in a five per cent. solution killed a rabbit in seven hours, whereas the same amount in a one per cent. solution had no bad effect. The author concludes that the antidote is of doubtful practicability, for, in the case of a two per cent. acid, death is so rapid that the antidote should be close at hand and used with all dispatch. If this be done, it will certainly react well and prove to be the nearest to an ideal antidote yet proposed.

It is suggested to inject 20 to 30 c.c. of a one-half per cent. solution subcutaneously, to counteract the effect of the poison already in the circulation, and to give several tumblerfuls by the mouth to neutralize any of the poison yet in the stomach.

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